









Journal of the New York Entomological Society

published by
The New York Entomological Society

Contents Volume 93, 1985, Numbers 1-4

Number 1

The Coccinellidae (Coleoptera) of America North of Mexico Robert D. Gordon 1-912

Number 2

A revision of the rove beetle tribe Falagriini of America North of Mexico (Coleoptera: Staphylinidae: Aleocharinae) E. Richard Hoebeke 913-1018

Brood VI of 17-year periodical cicadas, *Magicicada* spp. (Hemiptera: Cicadidae):
New evidence from Connecticut, the hypothetical 4-year deceleration, and the
status of the brood Chris T. Maier 1019-1026

The natural history of *Oncocnemis piffardi* (Walker) (Lepidoptera: Noctuidae)
Tim L. McCabe 1027-1031

Number 3

Male territorial behavior in four species of the tribe Cercerini (Sphecidae: Philanthinae) Howard E. Evans and Kevin M. O'Neill 1033-1040

Orientation behavior of the slave-making ant *Polyergus breviceps* in an oak-wood-
land habitat H. Topoff, M. Pagani, M. Goldstein, and L. Mack 1041-1046

Cooperative colony foundation by females of the leafcutting ant *Atta texana* in
the laboratory Alex Mintzer and S. B. Vinson 1047-1051

General activity and reproductive behavior of *Rhagoletis cornivora* (Diptera: Tephritidae) flies in nature David Courtney Smith 1052-1056

Dictyla echii: seasonal history and North American records of an immigrant lace
bug (Hemiptera: Tingidae) A. G. Wheeler, Jr. and E. Richard Hoebeke 1057-1063

Scanning electron microscopic demonstration of bacteria on tarsi of *Blattella*
germanica Pasko Gazivoda and Durland Fish 1064-1067

Parasitism and mortality caused by field and laboratory strains of *Brachymeria*
intermedia (Nees) (Hymenoptera: Chalcididae)
Yuen-shaung Ng, James H. Lashomb, and Robert Chianese 1068-1072

Notes on the spider genus <i>Eilica</i> (Araneae: Gnaphosidae)	Norman I. Platnick	1073–1081
Larval characters of a neotropical <i>Scotocryptus</i> (Coleoptera: Leiodidae), a nest associate of stingless bees (Hymenoptera: Apidae)	Quentin D. Wheeler	1082–1088
Species status and the hitherto unrecognized male of <i>Papilio diaphora</i> Staudinger (1891), (Lepidoptera: Papilionidae)	Kurt Johnson, Rick Rozycki, and David Matusik	1089–1095
Revision of the Nearctic species of <i>Hyssopus</i> Girault (Hymenoptera: Eulophidae)	Michael E. Schauff	1096–1108
Antagonism of entomogenous fungal extracts to Dutch elm disease fungus, <i>Ceratocystus ulmi</i>	J. N. Gemma, S. S. Wasti, and G. G. Hartmann	1109–1112
Melanism in <i>Phigalia titea</i> (Cramer) (Lepidoptera: Geometridae) in southern New England: A response to forest disturbance?	Theodore D. Sargent	1113–1120
Newly recognized synonyms, homonyms, and combinations in North American Miridae (Heteroptera)	Thomas J. Henry	1121–1136
Notes and Comments		
Surface vibrational cues in the precopulatory behavior of whirligig beetles	Steven A. Kolmes	1137–1140

Number 4

Charles P. Alexander: a tribute, with emphasis on his boyhood in Fulton County, New York, and his studies at Cornell University	A. G. Wheeler, Jr.	1141–1164
A revision of the pentatomine genus <i>Serdia</i> Stål, 1860 (Pentatomidae: Hemiptera)	Donald B. Thomas, Jr. and L. H. Rolston	1165–1172
Names proposed and taxonomic publications by Herbert Ruckes (1895–1965)	L. H. Rolston and D. A. Rider	1173–1181
Revision of the platynine carabid genus <i>Tanystoma</i> Motschulsky (Coleoptera)	James K. Liebherr	1182–1211
Neotype designation for <i>Scarites subterraneus</i> Fabricius 1775 (Coleoptera: Carabidae: Scaritini)	Stephen W. Nichols	1212–1215
<i>Anthrenus pimpinellae</i> F., a Palearctic dermestid established in eastern North America (Coleoptera: Dermestidae)	E. Richard Hoebeke, A. G. Wheeler, Jr., and Richard S. Beal, Jr.	1216–1222
New host associations for Cerambycidae (Coleoptera) from selected species of Leguminosae and Rutaceae	Marlin E. Rice	1223–1225
New <i>Ommatius</i> Wiedemann (Diptera: Asilidae) from Cuba and the Bahamas	A. G. Scarbrough	1226–1239
Review of the Caribbean <i>Geron</i> Meigen (Diptera: Bombyliidae)	A. G. Scarbrough and Deborah A. Davidson	1240–1260
New family placement for the genus <i>Cynipencyrtus</i> (Hymenoptera: Chalcidoidea: Tanaostigmatidae)	John LaSalle and John S. Noyes	1261–1264
On the monophyly of the spider suborder Mesothelae (Arachnida: Araneae)	Norman I. Platnick and Pablo A. Goloboff	1265–1270

Phytocoris adenostomae, a new mirine plant bug (Heteroptera: Miridae) from
southern California Gary M. Stonedahl 1271–1274

Notes and Comments

New water mite (Prostigmata: Parasitengona)—chironomid (Diptera) associations
from Otsego Lake, New York Thomas W. Simmons 1275–1276

Book Reviews

Escarabajos. 20 Millones Años de Evolución Brett C. Ratcliffe 1277–1278

The Spiders of Great Britain and Ireland Norman I. Platnick 1279–1280

Population Biology and Evolution John Jaenike 1280–1281

Chemical Ecology of Insects Robert H. Hagen 1281–1285

Courtship Behaviors of the Hawaiian Picture-winged *Drosophila*
David Grimaldi 1285–1287

Honorary, Life, and Sustaining Members 1288

Reviewers for 1985 1288

5 95, 7063
Ent.

Vol. 93

JANUARY 1985

No. 1

Journal
of the
New York
Entomological Society

(ISSN 0028-7199)



Devoted to Entomology in General

JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY

Editor: Randall T. Schuh, Department of Entomology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024

Book Review Editor: Quentin D. Wheeler, Department of Entomology, Cornell University, Ithaca, New York 14853

Publications Committee: Louis Trombetta, St. Johns University, Queens, New York, Chairman; Alfred G. Wheeler, Jr., Pennsylvania State Department of Agriculture, Harrisburg; Joseph M. Cerreta, St. Johns University, Queens, New York.

The New York Entomological Society Incorporating The Brooklyn Entomological Society

President: Gerard Iwantsch, Department of Biological Sciences, Fordham University, Bronx, New York 10458

Vice President: Henry M. Knizeski, Jr., Department of Biology, Mercy College, Dobbs Ferry, New York 10522

Secretary: Irene E. Matejko, Science Department, The New Lincoln School, New York, New York 10021

Assistant Secretary: Dennis J. Joslyn, Department of Biology, Rutgers University, Camden, New Jersey 08102

Treasurer: Louis Sorkin, Department of Entomology, American Museum of Natural History, New York, New York 10024

Trustees: *Class of 1984*—Joseph Cerreta, St. Johns University, Queens, New York; Durland Fish, Fordham University, Bronx, New York; *Class of 1985*—Peter Chabora, Queens College, New York; Charles Porter, Fordham University, Bronx, New York.

Annual dues are \$18.00 for established professionals with journal, \$10.00 without journal, \$10.00 for students with journal, \$5.00 without journal. Sustaining memberships are \$48.00 per year, institutional memberships are \$120.00 per year, and life memberships are \$300.00. Subscriptions are \$27.00 per year domestic and \$30.00 foreign. All payments should be made to the Treasurer. Back issues of the *Journal of the New York Entomological Society*, the *Bulletin of the Brooklyn Entomological Society*, *Entomologica Americana*, the *Torre-Bueno Glossary of Entomology* and other Society publications can be purchased from Lubrecht and Cramer, RD 1, Box 244, Forestburgh, New York 12777.

Meetings of the Society are held on the third Tuesday of each month (except June through September) at 8 p.m. in the American Museum of Natural History, Central Park West at 79th Street, New York, New York.

Mailed May 3, 1985

The Journal of the New York Entomological Society (ISSN 0028-7199) is published quarterly (January, April, July, October) for the Society by Allen Press, Inc., 1041 New Hampshire, Lawrence, Kansas 66044. Second class postage paid at New Brunswick, New Jersey and at additional mailing office.

Known office of publication: American Museum of Natural History, New York, New York 10024.
Journal of the New York Entomological Society, total copies printed 1,000, paid circulation 673, mail subscription 673, free distribution by mail 7, total distribution 680, 320 copies left over each quarter.

THE COCCINELLIDAE (COLEOPTERA) OF AMERICA NORTH OF MEXICO

ROBERT D. GORDON

*Systematic Entomology Laboratory
IIBIII, Agricultural Research Service USDA,
% U.S. National Museum of Natural History,
Washington, D.C. 20560*



JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY

Volume 93, fascicle 1, pages 1-912

Price per copy \$40.00



Plate 1.

Adalia bipunctata (L.)

Cycloneda polita Casey

Paranaemia vittigera (Mannerheim)

Axion tripustulatum (Degeer)

Hippodamia parenthesis (Say)

Chilocorus stigma (Say)

Epilachna borealis (F.)

Coccinella trifasciata perplexa Mulsant



Plate 2.

Didion punctatum (Melsheimer)

Diomus terminalis (Say)

Hyperaspis fastidiosa Casey

Psyllobora vigintimaculata (Say)

Brachiacantha uteella Casey

Nephaspis bioculatus (Blatchley)

Hyperaspis levrati Mulsant

Cephaloscymnus z. australis Gordon

THE COCCINELLIDAE (COLEOPTERA) OF
AMERICA NORTH OF MEXICO

ROBERT D. GORDON

TABLE OF CONTENTS

Introduction	3
Historical Resume	6
Methods	7
Terms	8
Acknowledgments	11
Biological Control and Coccinellidae in North America	12
Table 1	14
Table 2	29
Family Coccinellidae (Systematic Treatment)	33
Sticholotidinae	34
Microweisini	36
Serangiini	58
Cephaloscymnini	66
Scymninae	74
Zilini	74
Stethorini	88
Scymnini	99
Selvadiini	347
Hyperaspini	352
Cryptognathini	599
Chilocorinae	602
Chilocorini	602
Coccidulinae	654
Coccidulini	655
Noviini	662
Exoplectrini	668
Azyini	671
Coccinellinae	678
Coccinellini	679
Pyslloborini	851
Epilachninae	862
Epilachnini	863
Literature Cited	874
Index	893

Abstract.—The 57 genera and 475 species of Coccinellidae occurring in America north of Mexico are treated taxonomically. Keys to all taxa, descriptions of the higher taxa, species diagnoses, synonymies, and host records are included. Two new tribes, Cephaloscymnini and Selvadiini, are erected for the genera *Cephaloscymnus* Crotch and *Selvadius* Casey. New species are described as follows: *Brachiacantha barberi*; *B. rotunda*; *B. schwarzi*; *B. soltau*; *B. stephani*; *Exoplectra schaefferi*; *Gnathowisea ferox*; *G. hageni*; *G. micula*; *G. texana*; *Hyperaspis algonus*; *H. andrewsi*; *H. hardyi*; *H. nanellus*; *H. simulatus*; *Hyperaspis caseyi*; *H. deludens*; *H. dobzhanskyi*; *H. imitator*; *H. ornatella*; *H. schaefferi*; *H. uteana*; *Nephus* (S.) *timberlakei*; *Zagloba satana*; *Zilus horni*. A chapter on biological control involving the family Coccinellidae includes discussions of the introduced species established in North America, and tables listing all the species that have been introduced whether established or not.

Ladybird beetles (Coccinellidae) have been favorites of collectors and objects of general popular interest for centuries because of the bright, contrasting red and black colors of many of the species. Also, species tend to seek shelter in winter, hence are commonly found in and around dwellings at a time of year when most insects are not in evidence. Popular interest in the Ladybird (which in Europe is *Coccinella septempunctata*) goes back at least to the fifteenth century and probably much farther. The Ladybird is usually dedicated to the Virgin Mary; in Scandinavia it is called Nyckelpiga, our Lady's Key-maid, or Jung-fru Marias Gulhona, the Virgin Mary's Golden-hen. In Germany it is Frauen or Marien-Käfer, Ladybeetles of the Virgin Mary, and in France it is known as Bêtes de la Vierge, Animals of the Virgin. Many rhymes or verses stem from beliefs in the supernatural powers of the Ladybird, a few of which are recited below (from Cowan, 1865).

From Vienna a superstition connected with the Ladybird's ability to bring fine weather:

Little birdie, birdie
Fly to Marybrunn
and bring us a fine sun

From the marsh of the Elbe comes a similar request:

May-cat
Fly away
Hasten away
Bring me good weather with you tomorrow

Northern Germany (Ploen) gives us a request based on the belief that the Ladybird can foretell the harvest year; if the spots exceed 7, grain will be scarce, if there are fewer than 7, there will be an abundant harvest:

Maerspart, fly to heaven
Bring me a sack full of biscuits, one for me, one for thee,
for all the little angels one

In northern Europe it is thought to be lucky when a young girl sees the Ladybird in the spring, she lets it creep around her hand and says, "She measures me for wedding gloves." When it flies away the direction it takes is important because it signifies from what direction her sweetheart will come. England provides us with this rhyme:

This Ladyfly I take from off the grass,
whose spotted back might scarlet red surpass.
Fly, Ladybird, north, south, or east or west,
Fly where the man is found that I love best.
He leaves my hand, see to the west he's flown,
To call my true-love from the faithless town.

Also from England (Norfolk) comes a similar wish in verse:

Bishop, Bishop Barnabee,
Tell me when my wedding be:
If it be tomorrow day,
Take your wings and fly away!
Fly to the east, fly to the west,
Fly to him that I love best.

In Scotland the Ladybird is a great favorite, and we have still more rhymes concerning a sweetheart:

Lady, Lady Lanners
Lady, Lady Lanners,
Tak' up your elowk about your head,
An' flee awa' to Flanners (Flanders)
Flee ower firth and flee ower fell,
Flee ower pule and rinnan' well,
Flee ower muir, and flee ower mead,
Flee ower livan, flee ower dead,
Flee ower corn, and flee ower lee,
Flee ower river, flee ower sea,
Flee ye east, or flee ye west,
Flee till him that lo'es me best.

Or, —
King, King collowa,
Up your wings and flee awa'
Over land and over sea;
Tell me where my love can be!

The Ladybird rhyme best known to children in England and America follows with 2 English versions:

Ladybird, ladybird, fly away home;
Your house is on fire your children's at home,
All but one that ligs under the stone, —
Ply thee home, ladybird, ere it be gone.

From Yorkshire and Lancashire, —

Ladybird, ladybird, eigh thy way home;
Thy house is on fire, thy children all roam,
Except little Nan, who sits in her pan,
weaving gold laces as fast as she can.

The seemingly obscure meaning of the latter 2 rhymes is explained by the presence of the Ladybird in large numbers among hop vines. The larvae feed on aphids of the hop vine and fire was formerly used as a means of killing the aphids, thus effectively killing the Ladybirds as well.

From "The Zoology of the English Poets" by Newell (1845) come 2 rather elegant

examples of verse concerning the Ladybird. First, from the tragedy of Sir Thomas Moore by Hurdis:

Sir John.

What d'ye look at?

Cecilia.

A little animal, that round my glove,
And up and down to every finger's tip,
Has travelled merrily, and travels still,
Tho' it has wings to fly: what its name is
With learned men I know not; simple folk
Call it the lady-bird.

Sir John.

Poor harmless thing!

Save it.

Cecilia.

I would not hurt it for the world;
Its prettiness says, Spare me; and it bears
Armour so beautiful upon his back,
I could not injure it to be a queen:
Look, sir, its coat is scarlet dropp'd with jet,
Its eyes pure ivory.

Sir John.

Child, I am blind
To objects so minute: I know it well;
'Tis the companion of the waning year,
And lives among the blossoms of the hop;
It has fine silken wings enfolded close
Under that coat of mail.

Cecilia.

I see them, sir,

For it unfurls them now—'tis up and gone.

And, from Southey's "The Burnie-Bee":

Back o'er thy shoulders throw thy ruby shards,
With many a tiny coal-black freckle deck'd;
My watchful eye thy loitering saunter guards,
My ready hand thy footsteps shall protect.

So shall the fairy train, by glowworm light,
With rainbow tints thy folding pennons fret,

Thy scaly breast in deeper azure dight,
Thy burnish'd armour deck with glossier jet.

Some superstitions have existed about the Ladybird that don't appear in verse, such as the Ladybird as a cure for measles and colic (Newell, 1845); or as a cure for the toothache when specimens are mashed and put into the hollow tooth. This latter use of the Ladybird comes to us from Jaeger (1859) who states "I tried this application in two instances, and the tooth-ache was immediately relieved; but whether the remedy, or the faith of the patient, acted therapeutically, or the tooth ceased aching of itself, I confess I do not pretend to know."

Ladybird beetles are generally thought of as beneficial insects, predators of plant pests; this is true for the most part, particularly in temperate regions. In tropical regions, however, many are plant feeders, some economically significant. A few plant feeders occur in temperate regions, the Mexican bean beetle being the prime North American example.

Historically, the beneficial species have been classified as "Coccinellides Aphidiophages" (Chapuis, 1876) (aphid predators), and the plant feeders as "Coccinellides phytophages" (Chapuis, 1876). This designation of beneficial species as aphid predators is accurate only in part. The beneficials actually divide into groups of species, each of which has a preferred group of host species; as examples, species of Chilocorinae prey on scale insects, species of Stethorini on mites, and most species of Coccinellinae are aphid predators. However, in the absence or scarcity of preferred food, many species will feed on other insects such as the immature stages of Coleoptera, Lepidoptera, and Hymenoptera. Members of the genus *Coleomegilla* (Coccinellinae) are able not only to survive on a variety of foods, but to complete development when restricted to an unusual diet such as mites. Plant pollen also qualifies as an essential food for *Coleomegilla*, and members of this genus are evidently the most euryphagous of the Coccinellidae. The preferred food of another genus of Coccinellinae, *Neoharmonia*, is evidently the larvae of a genus of Chrysomelidae. Among the phytophagous Coccinellidae, most are typical leaf feeders, such as *Epilachna* and *Subcoccinella*, but the Psyllorini have acquired the unusual habit of feeding exclusively on fungal hyphae and spores.

Ladybirds are thus of considerable interest to naturalists, agriculturists, etc.; therefore a need exists for a comprehensive faunal treatment. The present volume is an attempt to fill that need.

The purpose of this treatment is to provide the means to identify the species of Coccinellidae occurring in America north of Mexico. To this end, keys, illustrations, diagnoses, and synonymies are provided for all taxa known to occur in North America. A brief chapter on biological control importation efforts is included because of the significance of many species as actual or potential control agents against plant pests.

HISTORICAL RESUME

Along with other animal groups, the classification of the Coccinellidae began with Linnaeus in the mid 1700's. Over the next 100 years it proceeded along the familiar paths of insect classification, attended to by Fabricius, Degeer, Thunberg, Herbst,

etc. In 1850, Mulsant produced a monograph of the Coccinellidae on a world basis that proved to be the foundation for modern classification and which still is an indispensable tool in any coccinellid specialist's shop. This treatment was so well done that large portions of it remain unaltered by subsequent research. In 1853 and 1866, Mulsant published additional information as supplements to the 1850 volume. The next major figure on the scene was George Robert Crotch, who again treated the world Coccinellidae (1874). He changed Mulsant's classification very little, but added several new genera and many new species. Crotch was followed by Julius Weise, who, although producing no single monumental work, succeeded in refining coccinellid classification in a series of papers from 1878 to 1930. Weise was a careful, observant worker whose contributions were highly significant. He was also the first coccinellid taxonomist to realize that male genitalia could be used to distinguish species, although he did not pursue this to any extent. Korschefsky, a protege of Weise, was an amateur coccinellid taxonomist of considerable ability. When Weise died before writing the Coccinellidae portion of the Junk Catalogue, Korschefsky proceeded to do the work which appeared in 1931 and 1932, and which remains the single most useful taxonomic publication for coccinellid specialists anywhere in the world. One of the most important contributions to coccinellid classification is relatively recent; Sasaji (1968) published the "Phylogeny of the family Coccinellidae (Coleoptera)," a thorough consideration of the relationships of the higher taxa of the family. This publication has served as the basis for subfamily and tribal assignments since 1968, and rightfully so; all morphological characteristics of adults and many larval characteristics have been incorporated in the scheme in a logical fashion. I regard this contribution as a landmark in coccinellid classification, to be compared in significance with Mulsant's classification of 1850.

Casey (1899) treated the Coccinellidae of the United States in their entirety, providing the foundation for taxonomic research in North America. The chief workers in North American Coccinellidae since 1899 are Leng (1903–1920), Dobzhansky (1931–1941), Chapin (1930–1966), Brown and de Ruette (1962), Brown (1962), and Gordon (1970–present). In addition, regional studies of Coccinellidae have been made by Stehr (1930), Minnesota; Wingo (1952), Upper Mississippi Basin; Hatch (1961), Pacific Northwest; J. Chapin (1974), Louisiana; and Belicek (1976), Western Canada and Alaska.

Comprehensive publications on the biology, ecology, nutrition, metabolism, etc., are few. Some sources that contain literature reviews are Hagen (1962), Hodek (1966), and Hodek (1967). Most recently Hodek (1973) has compiled much of this information in a single source. Hodek's book contains a short chapter on the taxonomy and morphology of adults and an excellent chapter on the taxonomy and morphology of the larvae. The bulk of the book is devoted to discussion of such biological relationships as natural enemies, food sources, variability, and habitat.

METHODS

In keeping with the primary purpose of this publication, to serve as an identification manual, the systematics portion is kept as simple as possible. Thus, taxa above the species level are fully described, but, except for new taxa, species are briefly diagnosed

rather than described. Illustrations are provided to facilitate identifications, and these should be considered an essential part of the work and used accordingly.

Primary types. An effort has been made to locate and examine type material of all authors included except the older European workers such as Linnaeus, Fabricius, etc. When a species has been described from more than one specimen without designation of a holotype, a lectotype is designated and, where possible, the remaining specimens of the type series are designated as paralectotypes. The major type depositories for North American Coccinellidae are the California Academy of Sciences, Museum of Comparative Zoology, and U.S. National Museum; other institutions in North America that are type repositories are the Canadian National Collection and Purdue University. In several instances the type specimens have not been located and are either known to be lost or are presumed to be. An example of the former is the Say collection; examples of the latter are the Randall types and some of the Crotch and Melsheimer types. When the type specimens are lost, not located, or not examined, the traditional concept of the species has been accepted.

Locality records. Nearly all of the locality records listed in the text were taken from specimens actually examined; published records were accepted only when the source was unquestionably authoritative. Under "Distribution" only the specified locality is given, plus county if stated on the label. Distribution data are given exactly as they appear on the label except that obvious misspellings are corrected. For new species, all information is given exactly as it appears on the label. Distributions are presented on maps with either symbols, shaded areas, or both. Shading is used when a species is commonly collected; symbols are used when a species is rarely collected or when the distribution pattern needs to be accurately defined. When a state record only is available, "S" with the appropriate symbol appears in that state on the map.

Host data. Host data for members of each genus are listed in the generic discussion. This is not intended to be a complete listing of all published host records; an exhaustive literature search has not been conducted, but all major sources of host information have been consulted, additional records have been discovered in the course of the study, and specimen label data have been included.

TERMS

Most of the morphological terms used are germane to beetles in general, but some are unique to ladybird beetles. To facilitate the use of the keys and descriptions, a brief glossary follows (see Figs. 1, 2).

accessory gland, thin walled, saclike structure attached in basal $\frac{1}{2}$ of spermathecal capsule of female genitalia.

basal lobe, median apical projection of phallobase of male genitalia serving as a guide for siphon.

basal piece, basal portion of phallobase of male genitalia to which the basal lobe, paramere, and trapes attach.

bursa copulatrix, thin walled, saclike structure between infundibulum or sperm duct and abdominal apex.

cornu, apical curved portion of spermathecal capsule of female genitalia.

cryptotetramerous (tarsus), tarsus composed of 4 segments, appearing 3 segmented because 3rd segment minute, concealed between lobes of 2nd segment.

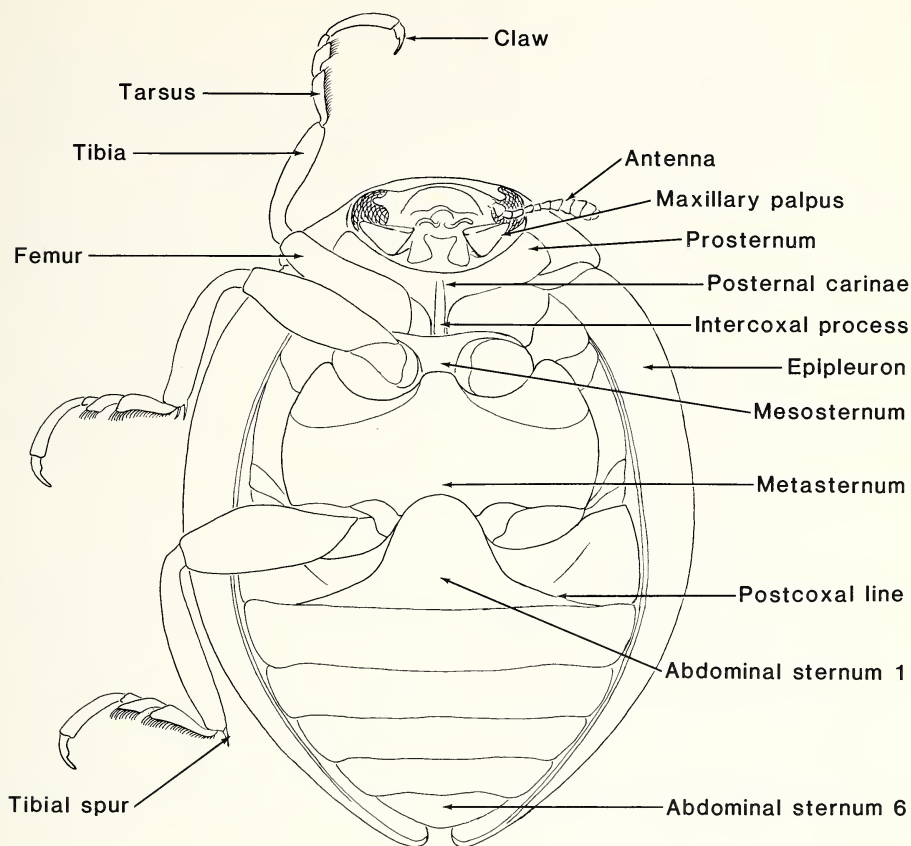


Fig. 1. *Coccinella novemnotata* Herbst—ventral view.

genital plates, sclerotized plates which are the divided 9th abdominal sternum in the female.

infundibulum, sclerotized, funnel-like structure between sperm duct and bursa copulatrix of female genitalia.

nodulus, basal part of spermathecal capsule of female genitalia.

paramere, paired lateral apical projection of phallobase of male genitalia serving to position and hold basal lobe in position during copulation.

phallobase, includes the basal piece, basal lobe, and paramere of male genitalia.

postcoxal line, the line on the 1st abdominal sternum posterior to hind coxa.

ramus, swelling or projection usually between cornu and nodulus of spermathecal capsule of female genitalia.

sipho, sclerotized, curved rod which is inserted through the basal lobe and into the female bursa copulatrix during copulation, corresponds to aedeagus or penis.

spermathecal capsule, part of the female genitalia composed of the cornu, ramus, and nodulus (one or both of the latter may be absent).

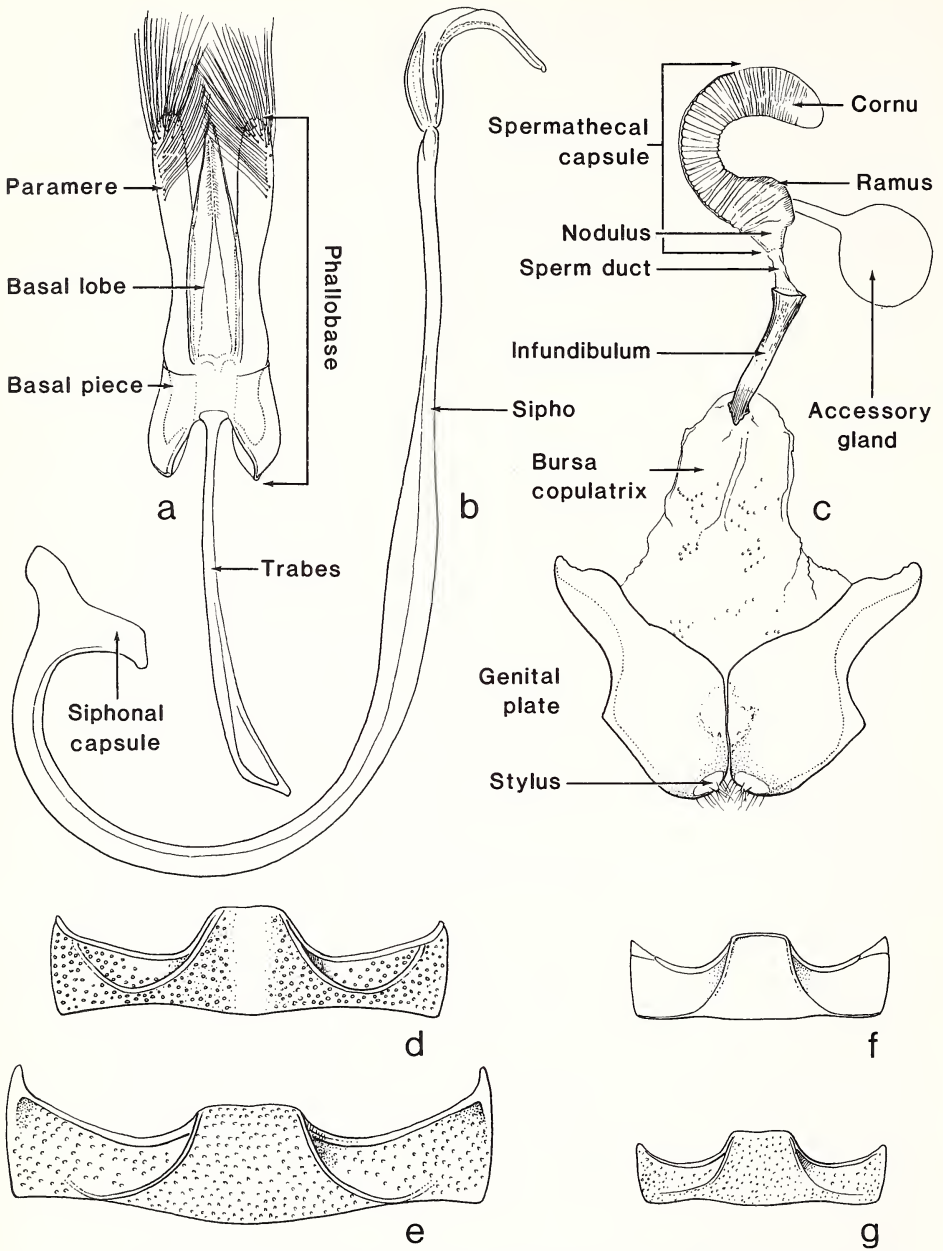


Fig. 2. Male and female genitalia and postcoxal lines of Coccinellidae. a, b. Male genitalia. c. Female. d-g. Postcoxal lines.

sperm duct, tube connecting spermathecal capsule to infundibulum or bursa copulatrix of female genitalia.

trabes, strut posterior to basal piece of male genitalia, connected by muscular attachment to basal piece.

trimerous (tarsus), tarsus composed of 3 segments.

The postcoxal line on the 1st abdominal sternum is a useful character for generic discrimination. This line takes 4 major forms in the Coccinellidae; I refer to these as the *Pullus*, *Scymnus*, *Diomus*, or *Nephus* types in the text without further explanation. These types are illustrated in Figure 2, and are characterized as follows: *Pullus* type-line complete, curved from base medially to base of sternum laterally; *Scymnus* type-line incomplete, curved from base medially and forward toward base of sternum laterally; *Diomus* type - line incomplete, extending down from base, joining apical margin of sternum; and *Nephus* type - line incomplete, extending down from base nearly to apical margin of sternum, extending parallel to apical margin toward lateral margin.

ACKNOWLEDGMENTS

For the loan of specimens of Coccinellidae I am indebted to the curators of the following institutional collections (acronyms are those used in the text): (BMNH) British Museum (Natural History), London, England; (CAS) California Academy of Sciences, San Francisco, California; (CDA) California Department of Agriculture, Sacramento, California; (CM) Carnegie Museum at Natural History, Pittsburgh, Pennsylvania; (CNC) Canadian National Collection, Ottawa, Ontario; (DLM) Museum d'Histoire Naturelle (Dejean Collection), Lyon, France; (FSCA) Florida State Collection of Arthropods, Gainesville, Florida; (HSPA) Hawaiian Sugar Planters Association, Honolulu, Hawaii; (INHS) Illinois Natural History Survey, Urbana, Illinois; (MCZ) Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; (NREA) Naturhistoriska Riksmuseet, Entomologiska Avdelningen, Stockholm, Sweden; (PAS) Philadelphia Academy of Sciences, Philadelphia, Pennsylvania; (PM) Museum National d'Histoire Naturelle, Paris, France; (PU) Purdue University, West Lafayette, Indiana; (UCCC) University of Cambridge (Crotch Collection), Cambridge, England; (UCR) University of California, Riverside, California; (UMMZ) University of Michigan Museum of Zoology, Ann Arbor, Michigan; (UMZH) University Museum Helsinki, Finland; (USNM) United States National Museum, Washington, D.C.; (WHN) William H. Nutting, Oakland, California; (ZMC) Zoologisk Museum Copenhagen, Universitets Copenhagen, Denmark.

Assistance in the form of specimens, library materials, advice, encouragement, etc., was rendered by the following individuals (institutional specimens were often involved, but acronyms do not appear in the text): G. E. Ball, University of Alberta, Edmonton, Alberta; W. F. Barr, University of Idaho, Moscow, Idaho; E. C. Becker, Biosystematics Research Institute, Agriculture Canada, Ottawa, Ontario; J. M. Campbell, Biosystematics Research Institute, Agriculture Canada, Ottawa, Ontario; J. B. Chapin, Louisiana State University, Baton Rouge, Louisiana; J. A. Chemsak, University of California, Berkeley, California; J. T. Doyen, University of California, Berkeley, California; H. Dozier, Clemson, South Carolina; W. A. Foster, University of Museum of Zoology, Cambridge, England; K. S. Hagen, University of California, Division of Biological Control, Albany, California; T. J. Henry, USDA, Systematic Entomology Laboratory, Washington, D.C.; H. F. Howden, Carleton University, Ottawa, Ontario; J. D. Lattin, Oregon State University, Corvallis, Oregon; L. LeSage, Biosystematics Research Institute, Agriculture Canada, Ottawa, Ontario; W. H. Nutting, Oakland, California; R. D. Pope,

British Museum (Natural History), London, England; J. Smart, University Museum of Zoology, Cambridge, England; A. G. Wheeler, Pennsylvania Department of Agriculture, Harrisburg, Pennsylvania; R. E. Woodruff, Florida Department of Agriculture, Gainesville, Florida.

Host arthropod and plant names were verified by the following individuals: E. W. Baker, D. R. Miller, and M. B. Stoetzel, USDA, Systematic Entomology Laboratory, Beltsville, Maryland; D. C. Wasshausen, Smithsonian Institution, Washington, D.C.

The illustrations were prepared by contract illustrators Arthur Cushman, Criglersville, Virginia, Janine Higgins, Paris, Virginia, Britt Griswold, Washington, D.C., and Systematic Entomology illustrators Linda Lawrence and Mary Lou Cooley. The color plates were prepared by George Venable, Department of Entomology, Smithsonian Institution, Washington, D.C.

For reviewing the manuscript I am indebted to J. B. Chapin, Louisiana State University, Baton Rouge, Louisiana; K. S. Hagen, University of California, Division of Biological Control, Albany, California; R. D. Pope, British Museum (Natural History), London, England; W. Steiner, Smithsonian Institution, Washington, D.C.; T. J. Henry, D. R. Whitehead, and E. W. Baker, USDA, Systematic Entomology Laboratory, Washington, D.C.; J. R. Coulson, Beneficial Insect Introduction Laboratory, Beltsville, Maryland.

BIOLOGICAL CONTROL AND COCCINELLIDAE IN NORTH AMERICA

The history of biological control in North America has been well documented beginning with Essig (1931). In addition to Essig, there have been several comprehensive reports on the subject which should be consulted for detailed information and bibliographies. Chief among these are DeBach (1964), Hagen and Franz (1973), and the articles in Huffaker and Messenger (1976). Clausen (1956b) discusses the status of successfully established beneficial introductions prior to that date. Clausen et al. (1978) present a broad view of the subject on a world wide basis.

The cottony cushion scale, a serious pest of citrus in California, precipitated the first attempts at introducing foreign parasites and predators into North America. In 1888, Albert Koebele was sent to Australia to obtain natural enemies and sent back to California several species of ladybird beetles, among which was the now famous "vedalia" beetle, *Rodolia cardinalis*. This species proved to be an immediate and spectacular success, and this success precipitated a wave of coccinellid introductions which included 46 species between 1891 and 1892, all brought or sent from Australia by Koebele (Hagen, 1974). Very few of these became established, and the interest in predaceous coccinellids waned in favor of parasitic Hymenoptera and, later, pesticides. In the 1960's and 1970's coccinellids were again introduced in significant numbers with several useful establishments resulting. Table 1 gives a summary of the species introduced into Canada and the United States, and is an attempt to list all coccinellid species that have been introduced, whether established or not. This attempt has not been completely successful because of ineffective record keeping during much of the last 80 years, but is nearly complete for 1950–1983. Available records show that 179 species have been intentionally imported into North America; 8 species have become established through accidental introductions, 5 of these had been intentionally introduced but did not become established where released. A total of 26 species of foreign Coccinellidae are now definitely or possibly established in North America, 16 of these resulting from intentional releases. Following are summaries of those species of Coccinellidae known to be established in North America as a result of intentional or accidental introductions. Clausen (1956b), and Clausen et al. (1978), and Tables 1 and 2 should be consulted for additional details.

Aphidecta oblitterata (L.)

Aphidecta oblitterata has been imported from Austria, Czechoslovakia, Germany, Norway, and Sweden and released in Canada, the Pacific Northwest, and North Carolina for control of the balsam woolly adelgid. The only release resulting in establishment was from Germany into North Carolina in 1960–1963. It now occurs in the Mt. Mitchell area only.

Azya orbiger a orbiger a Mulsant

There are no records of attempts made to introduce *A. orbiger a* into Florida. However, it is now definitely established in the Miami, Florida, area (1975 to date); providing yet another example of an apparent accidental introduction. Woodruff and Sailer (1977) reviewed the history of the genus regarding biocontrol efforts in Florida.

Chilocorus bipustulatus (L.)

Attempts to establish *Chilocorus bipustulatus* in California were made in 1905, 1915, and 1927 from Israel and Italy for control of the black scale, citrus scale, California red scale, etc. These attempts failed, but in 1951, *C. bipustulatus* was imported from Israel and released for control of the olive scale, this time with successful establishment. At present this species occurs in Fresno, Merced, and Madera counties, California, but the establishment may be tenuous.

Chilocorus kuwanae Silvestri

Introduced into the United States from Japan and China a number of times since 1895 (as *Chilocorus similis* or *kuwanae*). Establishment resulted from an introduction made in 1924–1925. White peach scale, California red scale, and San Jose scale were the primary target hosts. At present *C. kuwanae* is known to occur in the vicinity of Santa Barbara, California.

Coccinella septempunctata L.

Attempts to establish *C. septempunctata* in the United States began in 1956 and continued through 1971. Material was obtained from France, India, Italy, Norway, and Sweden and released in several of the northeastern states, with an accompanying rearing program that produced material sent to several other states as far west as Arizona. All of these attempts apparently failed; however, specimens were collected in Bergen County, New Jersey, in 1973 and 1974. The species is now known to be established in several eastern states, but the origin of the New Jersey establishment is unknown. Subsequent laboratory rearing and shipments of specimens have resulted in establishment of *C. septempunctata* in Connecticut, Delaware, Georgia, Maine, New York, Oklahoma, and Pennsylvania. *Coccinella septempunctata* was released in New Brunswick in 1959–1960 without ensuing establishment; however, it is now established in Quebec due either to an accidental introduction or spread northward from Maine (Laroche, 1979). New Jersey stock was also released in California, but apparently did not become established there (K. Hagen, pers. comm.).

Table 1. Species of Coccinellidae intentionally introduced into North America.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no T—temporary (inclusive dates)	Literature citation(s)
<i>Adalia conglomerata</i> (L.)	Japan	1958	?			J. Hall, pers. comm.
<i>Adalia conglomerata</i> (L.) (as <i>Adalia ronina</i> (Lewis))	Japan		X (1958) (1960–1963)	New Brunswick, Newfoundland, Nova Scotia	0	McGugan and Coppel (1962); CIBC Tech. Comm. No. 4 (1971)
<i>Adalia tetraspilota</i> (Hope)	Pakistan		X (1961)	North Carolina	0	Amman and Speers (1964)
	India, Pakistan		X (1959) (1960) (1961)	Oregon	0	Mitchell and Wright (1967); R. Dysart, pers. comm.
	India		X (1960)	Newfoundland	0	CIBC Tech. Comm. No. 4 (1971)
<i>Aphidecta oblitterata</i> (L.)	Austria, Germany, Czechoslovakia, Norway		X (1941) (1951–1958) (1959–1969)	British Columbia, New Brunswick, Newfoundland, Nova Scotia	0	McGugan and Coppel (1962); Canadian Insects Pest Rev. (1962–1963); CIBC Tech. Comm. No. 4 (1971)
<i>Azya luteipes</i> Mulsant	Germany, Sweden		X (1960) (1963) (1965–1966)	North Carolina	X (1964)	Amman (1961); Amman and Speers (1964)
<i>Azya orbigera</i> Mulsant	Brazil	1934	X (1958) (1959) (1963)	Oregon, Washington	0	Mitchell and Wright (1967)
<i>Brunoides suturalis</i> (F.) (as <i>Brunus suturalis</i>)	Argentina	1935	X (1934)	California	0	Clausen et al. (1978)
	Pakistan		X (1935)	California	0	Clausen et al. (1978)
	India, Pakistan		X (1955) (1973)	Southern California	0	Newell (1973); K. Hagen, pers. comm.
		1954	X (1954) (1955)	Florida	0	Selhime (1956); R. Dysart, pers. comm.
			X (1955)	California, Texas (via Florida)	0	Selhime (1956)
	Pakistan		X (1956)	Texas	0	R. Dysart, pers. comm.
	Japan	1979	X (1979) (1981) (1982)	Washington	0	R. Fye, pers. comm.
<i>Calvia quatuordecim-guttata</i> (L.)	Japan		X (1979)	Oklahoma	0	R. Dysart, pers. comm.

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no T—temporary (inclusive dates)	Literature citation(s)
<i>Calvia</i> sp.	India	1972	X (1961)	North Carolina	0	Amman and Speers (1964)
<i>Catana chapini</i> Kapur	India		?			J. Hall, pers. comm.
<i>Catana parcesetosa</i> (Sicard)	India		X (1973)	Southern California	0	Newell (1973)
<i>Catana</i> sp., probably <i>C. parcesetosa</i>	Pakistan		X (1956)	Florida	0	R. Dysart, pers. comm.
<i>Catana perdistinctus</i> Kapur	India	1972	?			J. Hall, pers. comm.
<i>Cheilomenes lunata</i> (F.)	South Africa	1948	?			J. Hall, pers. comm.
<i>Chilocorus</i> <i>angolensis</i> Crotch	East Africa	1947	X (1948–1949)	California	0	Clausen et al. (1978)
<i>Chilocorus</i> <i>bipustulatus</i> (L.)	Israel	1905	X (1905)	California	0	Clausen et al. (1978)
	Italy	1915, 1927	X (1915) (1927)	California	0	Essig (1931)
	Israel	1951	X (1952–1953) (1959–1962) (1965)	California	T (1952–1956) X (1957)	Clausen (1959); Fleschner (1961–1962); Huffaker and Doutt (1965); Clausen et al. (1978)
<i>Chilocorus</i> <i>circumdatius</i> (Schoenherr)	China	1899, 1947	X (1899)	California	0	Essig (1931)
	India	1959–1960	X (1959)	California	0	Fleschner (1959)
<i>Chilocorus</i> <i>discoideus</i> Crotch	Kenya	1956–1957	X (1956)	California	0	Clausen (1959); Clausen et al. (1978)
<i>Chilocorus disigma</i> Klug	South Africa	1946	X (1946–1948)	California	0	Clausen et al. (1978)
<i>Chilocorus</i> sp. near <i>distigma</i> Klug	Eritrea	1953	X (1953)	California	0	Clausen et al. (1978)
<i>Chilocorus kuwanae</i> Silvestri (as <i>Chilocorus similis</i> (Ross))	China, Japan	1895–1896 1901–1902	X (1896) (1902)	Eastern States, Georgia	0	Clausen et al. (1978)
	China	1924–1925	X (1925)	California	X	Clausen et al. (1978)
	Japan	1955–1956	X (1956)	Pacific Northwest	0	Clausen et al. (1978)
<i>Chilocorus rubidus</i> <i>tristis</i> Falderman	Japan (through Canada)	1956–1957	X (1957)	California	0	Clausen et al. (1978)

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no T—temporary (inclusive dates)	Literature citation(s)
<i>Chilocorus wahlbergi</i> Mulsant	South Africa	1947	X (1947–1948)	California	0	Clausen et al. (1978)
<i>Chilocorus</i> sp.	India		X (1957)	Southern California	0	Clausen (1957)
<i>Chilocorus</i> sp.	South Africa	1971	0		0	R. Dysart, pers. comm.
<i>Coccidophilus citricola</i> Brèthes	Brazil	1935	X (1935)	California	T ("several years")	Clausen et al. (1978)
	Brazil	1958	?			J. Hall, pers. comm.
<i>Coccinella intermedia</i> (Crotch)	Kenya	1956	?			J. Hall, pers. comm.
<i>Coccinella luteopicta</i> Mulsant (as <i>Adalia luteopicta</i>)	India		X (1960)	Newfoundland	0	CIBC Tech. Comm. No. 4 (1971)
	India		X (1961)	Oregon	0	Clausen et al. (1978); Mitchell and Wright (1967)
<i>Coccinella septempunctata</i> L.	Iraq	1955	X (1958)	Southern California	0	J. Hall, pers. comm.
	France, India, Italy, Norway, Sweden	1956–1971	X (1956–1971)	Delaware, Maryland, New Jersey, Pennsylvania, Virginia, Ohio, Maine, Florida, Georgia, South Carolina, Washington	X Connecticut, Delaware, Georgia, Maine, New York, Oklahoma, Pennsylvania	Angalet (1975); Angalet (1979); R. Dysart, pers. comm.
	India		X (1958)	Arizona	0	R. Dysart, pers. comm.
	India		X (1959–1960)	New Brunswick	0	CIBC Tech. Comm. No. 4 (1971)
<i>Coccinella transversalis</i> F. (as <i>Coccinella repanda</i> Thunberg)	New Jersey	1979	X (1979)	California	0	K. Hagen, pers. comm.
	Australia		?			J. Hall, pers. comm.
<i>Coccinella undecimpunctata</i> (L.) (as <i>Coccinella novaezealandica</i> Colenso)	New Zealand	1889	X (1889)	Alhambra, California	0	Essig (1931)

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no T—temporary (inclusive dates)	Literature citation(s)
<i>Coccinellina pulchella</i> (Mulsant)	Brazil	1982	X (1982)	California	0	K. Hagen, pers. comm.
<i>Coelophora inaequalis</i> (F.)	Puerto Rico	1939	X (1939)	Florida, Georgia, Louisiana	0	Clausen et al. (1978)
<i>Coelophora parthenica</i> Meyrick	Pakistan		X (1974)	California	0	Newell (1974)
<i>Cryptognatha gemellata</i> Mulsant (as <i>Cryptognatha similina</i> Sicard)	Trinidad	1936	X (1936)	California, Florida	0	Dohanian (1937)
<i>Cryptognatha nodiceps</i> Marshall	Puerto Rico, Trinidad	1936, 1938	X (1936) (1938)	Florida (Miami)	0	Clausen (1956); Collection data
<i>Cryptolaemus affinis</i> Crotch	New Guinea		X (1973)	California	0	Dohanian (1937)
<i>Cryptolaemus montrouzieri</i> Mulsant	Australia	1891, 1930	X (1891) (1930)	Northern and Southern California	X (1892)	Essig (1931); Clausen (1956b); Clausen et al. (1978)
<i>Cryptolaemus wallacei</i> Crotch	California	1908	X (1908)	Louisiana	0	Garrett (1910)
<i>Curtinus coeruleus</i> Mulsant	California		X (?)	Florida	X (1939)	Muma (1955)
	California		X (1940) (1941)	Virginia	0	Haessler and Clancy (1944)
	Australia	1978	X (1973)	Central California	X (1980)	K. Hagen, pers. comm.
	Japan			California	0	Newell (1973)
<i>Cryptolaemus wallacei</i> Crotch	Mexico	1953	?			J. Hall, pers. comm.
<i>Cycloscymnus minutus</i> Blackburn	Australia		X (1892)	Southern California	0	Essig (1931)
<i>Cyrena nigellum</i> Blackburn	Australia		X (1892)	Southern California	0	Essig (1931)
<i>Dionus punilio</i> Weise (as <i>Scymnus flavifrons</i> Blackburn)	Australia		X (1892) (1975) (1978)	California	X (1979)	Essig (1931); Shorey (1975); van den Bosch (1978); K. Hagen, pers. comm.
	Australia		X (1958–1960)	British Columbia, New Brunswick, Nova Scotia	0	CIBC Tech. Comm. No. 4 (1971)

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—not release status unknown	Release area(s)	Establishment		Literature citation(s)
					X—yes (date confirmed)	0—no T—temporary (inclusive dates)	
<i>Diomus punilio</i>	Australia		X (1959) (1960)	Washington	0		Mitchell and Wright (1967)
Wiese (as <i>Scymnus</i> (<i>Scymnus nobius</i>) <i>pumilio</i>)	Australia		X (1960)	North Carolina	0		Clausen et al. (1978)
<i>Diomus</i> sp., "black-face" (possibly <i>Diomus pumilio</i>)	Australia		X (1979)	Texas	?		R. Dysart, pers. comm.
<i>Diomus</i> sp., "brown-face" (probably <i>Diomus pumilio</i>)	Australia	1979	0		0		R. Dysart, pers. comm.
<i>Diomus</i> sp.	Australia		X (1972) (1973) (1974)	California	0		Newell (1972, 1973, 1974)
<i>Egleis kingi</i> Macleay	Australia		X (1931)	Southern California	0		Essig (1931)
<i>Eriopsis connexa</i>	Chile		X (1970) (1971) (1974)	California	0		Bay (1970, 1971); Newell (1973, 1974)
Mulsant	Australia		X (1982)	Southern California	0		Essig (1931)
<i>Erithionyx lanosus</i> Blackburn	South Africa	1918–1925	X (1918–1925) (1947)	California	X (1978)		Clausen et al. (1978); van den Bosch (1978); Tassan et al. (1982)
<i>Exochomus flavipes</i> (Thunberg)		1978, 1980, 1981, 1982, 1983	X (1978) (1980) (1981) (1982) (1983)	California	0		Clausen et al. (1978)
<i>Exochomus floralis</i> (Motschulsky)	Morocco	1953	X (1955)	California	0		Clausen et al. (1978)
<i>Exochomus lituratus</i> Gorham	Pakistan		X (1960) (1961)	Oregon	0		Clausen et al. (1978); Mitchell and Wright (1967)
	Pakistan		X (1960) (1963)	New Brunswick, Newfoundland, Nova Scotia	0		CIBC Tech. Comm. No. 4 (1971)
<i>Exochomus melanocephalus</i> Zoubk.	South Africa	1924	X (1924)	California	0		Clausen et al. (1978)
<i>Exochomus metallicus</i> (Korscheltsky)	Eritrea	1954	X (1954)	California	X (1957)		Clausen et al. (1978)

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no T—temporary (inclusive dates)	Literature citation(s)
<i>Exochomus quadripustulatus</i> (L.)	France Italy	1905, 1906 1915, 1927–1928	X (1906) X (1915) (1927)	Massachusetts California	0 X (1928)	Clausen (1956b) Essig (1931); Clausen (1956b)
	England	1935–1937	X (1935–1937)	New Brunswick	0	Canadian Ins. Pest Rev. (1938)
<i>Exochomus uropygialis</i> Mulsant	Greece Pakistan	1979	X (1981) X (1959) (1960)	California Oregon, Washington	0 0	K. Hagen, pers. comm. Clausen et al. (1978); Mitchell and Wright (1967)
	India, Pakistan Australia		X (1959–1960) (1963–1964) X (1892)	New Brunswick, Newfoundland, Nova Scotia Southern California	0 X (1892)	CIBC Tech. Comm. No. 4 (1971) Essig (1931); Clausen (1956b)
<i>Halmus chalybeus</i> (Boisduval) (as <i>Orcus chalybeus</i>)	New Zealand	1891	0	California	0	Essig (1931)
<i>Harmonia antipodum</i> (White) (as <i>Leis antipodum</i>)	Japan	1916, 1964	X (1916) (1964) (1965)	California	0	Essig (1931); Chant (1964, 1965)
<i>Harmonia axyridis</i> (Pallas)	Japan Japan Japan USSR Japan, USSR	1978	X (1978–1982) ? X (1981) X (1978–1981)	Washington Georgia Nova Scotia Connecticut, Georgia, Louisiana, Maryland, Washington, D.C., Delaware, Maine, Mississippi, Ohio, Pennsylvania	? 0 ? ?	R. Fye, pers. comm. J. Coulson, pers. comm. R. Dysart, pers. comm. R. Dysart, pers. comm.
<i>Harmonia breiti</i> Mader	India, Pakistan India India, Pakistan		X (1961) X (1959) X (1959–1960)	North Carolina Oregon New Brunswick, Newfoundland	0 0 0	Amman and Speers (1964) Mitchell and Wright (1967) CIBC Tech. Comm. No. 4 (1971)

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no T—temporary (inclusive dates)	Literature citation(s)
<i>Harmonia conformis</i> (Boisduval) (as <i>Leis conformis</i>)	Australia	1892, 1978–1979	X (1892) (1972) (1975) (1976) (1977) (1978) (1979) (1980) X (1981) (1982)	Southern California	0	Essig (1931); Newell (1972, 1974); Shorey (1975, 1976, 1977); van den Bosch (1978) K. Hagen, pers. comm. R. Fye, pers. comm.
<i>Harmonia dimidiata</i> (F.) (as <i>Leis dimidiata</i> 15-spilota Hope)	? via California	1981	X (1981) X (1982) X (1926) (via California) X (1975) X (1959) X (1959) (1961) X (1961)	Maine, Maryland California Florida	0 0 X (1927)	R. Dysart, pers. comm. Clausen (1956b) Clausen et al. (1978)
<i>Harmonia eucharis</i> (Mulsant) (as <i>Ballia eucharis</i> and <i>Ballia dianae</i> Mulsant, a synonym)	India India, Pakistan India	1924	X (1975) X (1959) X (1959) (1961) X (1961)	California Oregon Oregon North Carolina	0 0 0 0	Shorey (1975) Mitchell and Wright (1967) Clausen et al. (1978); Mitchell and Wright (1967) Amman and Speers (1964)
<i>Harmonia octomaculata</i> (F.) (as <i>Coccinella arcuata</i> F.)	Australia, Fiji		X (1892)	Southern California	0	Essig (1931)
<i>Hippodamia variegata</i> (Goeze) (as <i>Adonia variegata</i>)	India India	(1983)	X (1957) X (1957–1958) (1983)	California Arizona, Florida, Georgia, Louisiana, Maryland, Maine, Nebraska, New Jersey, Pennsylvania, South Carolina, Texas	0 ?	Clausen (1959) R. Dysart, pers. comm.; G. Michels, pers. comm.
	India		X (1957–1958) (1961) X (1981)	North Carolina Delaware	0 0	Amman and Speers (1964) J. Coulson, pers. comm.; R. Dysart, pers. comm. K. Hagen, pers. comm.
<i>Hyperaspis globosa</i> Casey	Soviet Union Mexico		X (1955)	Southern California	0	

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no T—temporary (inclusive dates)	Literature citation(s)
<i>Hyperaspis japonica</i> (Crotch)	Japan	1923	0			Essig (1931)
<i>Hyperaspis jucunda</i> Mulsant	Trinidad	1955	?			J. Hall, pers. comm.
<i>Hyperaspis</i> sp. nr. <i>lunulata</i> Mulsant	Mexico	1954	?			J. Hall, pers. comm.
<i>Hyperaspis senegalensis hottentota</i> Mulsant	South Africa	1978, 1980, 1981, 1982, 1983	X (1978) (1980) (1981) (1982) (1983)	California	X (1982)	van den Bosch (1978); Tassan et al. (1982); K. Hagen, pers. comm.
<i>Hyperaspis</i> sp. <i>Illeis galbulula</i> (Mulsant) (as <i>Leptotheca galbulula</i>)	Ethiopia		X (1972)	California	0	Newell (1972)
<i>Jauravia limbata</i> (Motschulsky)	Australia		X (1892)	Southern California	0	Essig (1931)
<i>Liodadalia flavomaculata</i> (DeGeer)	China	1947	?			J. Hall, pers. comm.
<i>Liodadalia signifera</i> (Reiche)	South Africa	1958, 1983	?	Texas (1983)	?	J. Hall, pers. comm. G. Michels, pers. comm.
<i>Lemnia biplagiata</i> (Swartz) (as <i>L. personata</i> Weise)	Ethiopia	1956	?			J. Hall, pers. comm.
<i>Lemnia saucia</i> Mulsant (as <i>L. swinhoi</i> Crotch)	Taiwan, Japan		X (1961) X (1965)	Southern California	0	Fleschner (1961); Chant (1965)
<i>Lotis neglecta</i> Mulsant	Taiwan		X (1961)	Southern California	0	Fleschner (1961)
<i>Lotis nigerrima</i> Casey	South Africa	1947	X (1947–1948)	California	0	Clausen et al. (1978)
	South Africa	1947	X (1947–1948)	California	0	Clausen et al. (1978)

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no T—temporary (inclusive dates)	Literature citation(s)
<i>Menochilus quadriplagiatus</i> (Swartz) (as <i>Cheilomenes quadriplagiatus</i>) (<i>M. quadriplagiatus</i>) is a synonym of <i>M. sexmaculatus</i>)	Japan Hong Kong Hong Kong		X (1964) (1965) X (1979) X (1979–1982)	California Louisiana, Oklahoma Washington	0 0 0	Chant (1964, 1965) R. Dysart, pers. comm. R. Fye, pers. comm.
<i>Menochilus sexmaculatus</i> (F.) (as <i>Cheilomenes sexmaculata</i>)	India India from India via Texas from India via Florida	1910 1955 1912	? X (1954) X (1955) X (1912)	Florida California, New Jersey, Texas Florida California	0 0 0 0	Essig (1931) R. Dysart, pers. comm. Selhime (1955) Essig (1931)
<i>Microaspis lineata</i> (Thunberg) (as <i>Perantia frenata</i> (Erichson))	India Taiwan Hong Kong Pakistan Australia		X (1960) X (1961) X (1979) X (1975) (1976) X (1891)	California California Washington Oklahoma Southern California	0 0 0 0 0	Fleschner (1960) Fleschner (1961) R. Fye, pers. comm. R. Dysart, pers. comm. Essig (1931)
<i>Microaspis lineola</i> (F.) (as <i>Perantia lineola</i>)	Australia		X (1892)	Southern California	0	Essig (1931)
<i>Midus pygmaeus</i> Blackburn	Australia	1892, 1928	X (1892) (1928)	Southern California	0	Essig (1931); Clausen et al. (1978)
<i>Neda testudinaria</i> Mulsant	Australia		X (1892)	Southern California	0	Essig (1931)
<i>Nephus</i> (<i>Stidis</i>) <i>binaevatus</i> (Mulsant) (as <i>Scymnus binaevatus</i>)	South Africa	1921, 1922	X (1922)	California	X (1922)	Essig (1931); Clausen (1956b)

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no T—temporary (inclusive dates)	Literature citation(s)
<i>Nephus bipunctatus</i> Kugelann (as <i>Cryptogonus orbiculus</i> Gyllenhal)	Philippine Islands	1910	X (1910)	Southern California	T (1910-?)	Essig (1931)
<i>Nephus phosphorus</i> Lewis	Japan	1973	?			J. Hall, pers. comm.
<i>Nephus</i> sp.	Mexico Trinidad		X (1957) X (1957)	Southern California Southern California	0 0	Clausen (1959) Clausen (1957)
<i>Oenopia conglobata</i> (L.) (as <i>Synharmonia conglobata</i>)	India, Iran		X (1957) (1960) (1961)	California	0	Clausen et al. (1978); Fleschner (1961)
<i>Oenopia sauzeti</i> Mulsant	India	1981	X (1959)	Pacific Northwest	0	Mitchell and Wright (1967)
<i>Paraprius australasiae</i> (Boisduval) (as <i>Orcus australasiae</i>)	Yugoslavia		X (1981) (1982)	Washington	0	R. Fye, pers. comm.
	India		X (1961)	North Carolina	0	Amman and Speers (1964)
	India		X (1960)	Oregon	0	Mitchell and Wright (1967)
	Australia	1891, 1892, 1927	X (1892) (1927)	California	T (1892-?)	Essig (1931)
<i>Paraprius nummalis</i> (Boisduval) (as <i>Orcus nummalis</i>)	Australia		X (1892)	Southern California	0	Essig (1931)
<i>Penitilia</i> sp. nr. <i>nigella</i> Weise	Mexico		X (1955)	Southern California	0	Clausen (1956a)
<i>Penitilia</i> sp.	Honduras		X (1955)	Southern California	0	Clausen (1956a)
<i>Pharoscyrnus exiguus</i> Weise	South Africa	1947	X (1947-1948)	California	0	Clausen et al. (1978)
<i>Pharoscyrnus horni</i> Weise	Orient	1923	X (1923)	California	0	Clausen et al. (1978)
<i>Pharoscyrnus inaequalis</i> Casey	South Africa	1958	?			J. Hall, pers. comm.
<i>Pharoscyrnus</i> sp.	India		X (1957)	Southern California	0	Clausen (1959)

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no T—temporary (inclusive dates)	Literature citation(s)
<i>Prisius bilunulatus</i> (Boisduval) (as <i>Orcus bilunulatus</i>)	Australia	1892	X (1892)	California	0	Essig (1931)
<i>Propylea japonica</i> (Thunberg)	Taiwan		X (1961) (1964)	California	0	Fleschner (1961); Chant (1964)
<i>Propylea quatuordecimpunctata</i> (L.)	France		X (1970–1972)	New Jersey	0	J. Coulson, pers. comm.; R. Dysart, pers. comm.
	France, USSR		X (1979)	Delaware, Oklahoma	0	R. Dysart, pers. comm.
	Yugoslavia	1980	X (1981) (1982)	Washington	0	R. Fye, pers. comm.
	Puerto Rico	1938	X (1938)	Southern Florida	T (1939)	Clausen (1956b)
<i>Pseudazaya trinitatis</i> (Marshall) (as <i>Azya trinitatis</i>)	Hong Kong	1955	X (1973)	California	0	Newell (1973)
<i>Pseidoscymnus</i> sp.	Italy		?			J. Hall, pers. comm.
<i>Psyllobora vigintiduopunctata</i> (L.) (as <i>Thea vigintiduopunctata</i>)	Australia		X (1892)	Southern California	0	Essig (1931)
<i>Rhyzobius auranitii</i> Blackburn	Australia		X (1892)	Southern California	0	Essig (1931)
<i>Rhyzobius caesus</i> Blackburn	Australia		X (1892)	California	T (1892–1893)	Essig (1931); Clausen (1956b); Cressman (1933)
<i>Rhyzobius debilis</i> Blackburn	Australia	1892	X (1892)	Louisiana	0	Essig (1931)
	?	?	?(1933)	Southern California	0	Essig (1931)
<i>Rhyzobius dorsalis</i> Blackburn	Australia		X (1889) (1892)	California	X (1892)	Essig (1931) (as <i>R. ventralis</i>)
<i>Rhyzobius forestieri</i> (Mulsant) (as <i>R. ventralis</i>)	Australia	1889, 1892	X (1892)	Southern California	0	Essig (1931)
<i>Rhyzobius fugax</i> Blackburn	Australia		X (1892)	California	0	Clausen et al. (1978); Fleschner (1962); Chant (1964, 1965)
<i>Rhyzobius lindi</i> Blackburn	Australia	1964–1966	X (1964) (1965)		0	

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no T—temporary (inclusive dates)	Literature citation(s)
<i>Rhyzobius lophanthae</i> (Blaisdell) (as <i>Lindorus lophanthae</i>)	Australia	1892	X (1892)	California	X (1892)	Essig (1931); Clausen (1956b)
<i>Rhyzobius pulcher</i> Blackburn	South Africa		X (1959)	Texas	?	R. Dysart, pers. comm.
<i>Rhyzobius ruficollis</i> Blackburn	Australia	1972	X (1892)	Southern California	0	Essig (1931)
<i>Rhyzobius satellus</i> Blackburn	Australia		?			J. Hall, pers. comm.
<i>Rhyzobius speculifer</i> Blackburn	New Zealand	1892, 1961–1963	X (1892) (1962)	Southern California	0	Essig (1931); Clausen et al. (1978); Fieschner (1962)
<i>Rhyzobius ventralis</i> (Erichson)	Australia	1889	X (1892)	California	0	Essig (1931)
<i>Rhodolia bellus</i> (Blackburn) (as <i>Novius bellus</i>)	Australia	1889	X (1889)	Southern California	0	Essig (1931); Pope (1981)
<i>Rhodolia cardinalis</i> (Mulsant)	Australia	1888, 1889	X (1889)	Southern California	0	Essig (1931)
<i>Rhodolia iceryae</i> Janson	South Africa	1947	X (1947–1948)	California	X (1889)	Essig (1931)
<i>Rhodolia koebele</i> (Olliff) (as <i>Novius koebele</i>)	Australia	1891	X (1892)	California	0	Smith and Flanders (1949)
<i>Rhodolia rufopilosa</i> Mulsant	Hong Kong	1953	?	Southern California	T (1892–1929)	Essig (1931)
<i>Scymnus angustus</i> Casey	South Africa	1959	?			J. Hall, pers. comm.
<i>Scymnus aperzi</i> Mulsant	Israel	1955	?			J. Hall, pers. comm.
<i>Scymnus australasiae</i> Blackburn	Australia		X (1892)	Southern California	0	Essig (1931)

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no T—temporary (inclusive dates)	Literature citation(s)
<i>Scymnus coccivora</i>	India	1956	?			J. Hall, pers. comm.
Ramakrishna						
<i>Scymnus (Pullus) impexus</i> Mulsant	Germany		X (1951–1966) (1968)	British Columbia, New Brunswick, Newfoundland, Nova Scotia	T (1951–1959)	Clark and Brown (1961); CIBC Tech. Comm. No. 4 (1971)
	Germany		X (1959)	Maine	0	R. Dysart, pers. comm.
	Germany		X (1960) (1962) (1965–1967)	North Carolina	T ? (1961)	Gordon (1976b)
	Germany		X (1960) (1962)	Oregon	X (1967)	Mitchell and Wright (1967)
<i>Scymnus interruptus</i>	France	1978	X (1978) (1979)	California	0	van den Bosch (1978)
Goeze						
<i>Scymnus levillanti</i> Mulsant	Israel	1955	?			J. Hall, pers. comm.
<i>Scymnus moreletii</i> Mulsant	South Africa	1958	?			J. Hall, pers. comm.
<i>Scymnus notescens</i>	Australia	1928	X (1928)	California	0	Clausen et al. (1978)
Blackburn						
<i>Scymnus nubilus</i> Mulsant	India		X (1957) (1958)	Arizona, California, Delaware, Florida, Louisiana, Maryland, North Carolina, Nebraska, Pennsylvania	0	Clausen (1959); R. Dysart, pers. comm.
				California	0	Smith and Flanders (1949)
<i>Scymnus quadri-vittatus</i> Mulsant	South Africa	1947	X (1948–1949)	Southern California	0	Fleschner (1960)
<i>Scymnus</i> sp. nr. <i>quadrivittatus</i> Mulsant	South Africa		X (1960)			
<i>Scymnus sidneyensis</i>	Australia		X (1892)	Southern California	0	Essig (1931)
Blackburn						
<i>Scymnus (Pullus) suturalis</i> (Thunberg)	Germany		X (1961)	Michigan	?	R. Dysart, pers. comm.; Hoebeke (in press)
<i>Scymnus whittonensis</i> Blackburn	Australia		X (1892)	Southern California	0	Essig (1931)

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no T—temporary (inclusive dates)	Literature citation(s)
<i>Scymnus (Pullus) sp.</i>	Australia		X (1972) (1973)	California	0	Newell (1971, 1972, 1973)
<i>Scymnus sp.</i>	Mexico		X (1966)	Southern California	0	Chant (1966)
<i>Serangium flavescens</i> (Motschulsky)	India	1913	0			Woglum (1913)
<i>Serangium hirtuosum</i> Blackburn	Australia		X (1892)	Southern California	0	Essig (1931)
<i>Serangium maculigerum</i> Blackburn	Australia		X (1892)	Southern California	0	Essig (1931)
<i>Stethorus glivifrons</i> (Mulsant)	China	1955, 1960	X (1955) (1960)	Southern California	0	Clausen et al. (1978)
<i>Stethorus granum</i> (Gorham) (as <i>S. guatemalensis</i> Hall & Fieschner)	Guatemala	1955	X (1955)	Southern California	0	Clausen et al. (1978)
<i>Stethorus jejunos</i> Casey	South Africa	1958	?			J. Hall, pers. comm.
<i>Stethorus nigripes</i> Kapur (as <i>Stethorus loxtoni</i> Britton)	Australia	1978	X (1974) X (1978)	California California	0 0	Shorey (1976) K. Hagen, pers. comm.
<i>Stethorus punctillum</i> Weise	Turkey	1955	X (1955)	Southern California	0	Clausen et al. (1978)
<i>Stethorus vagans</i> (Blackburn)	Australia	1900, 1901	X (1901)	California	0	Essig (1931)
<i>Stethorus sp. "D"</i>	India		X (1957)	Southern California	0	Clausen (1959)
<i>Stethorus sp. "P"</i>	Pakistan		X (1957)	Southern California	0	Clausen (1959)
<i>Stethorus sp.</i>	India		X (1957)	Southern California	0	Clausen (1957)
<i>Stethorus sp.</i>	Eritrea		X (1953)	Southern California	0	Clausen (1955)
<i>Stethorus sp.</i>	Morocco		X (1953)	Southern California	0	Clausen (1955)
<i>Stethorus sp.</i>	Pakistan		X (1957)	Southern California	0	Clausen (1957)

Table 1. Continued.

Species	Country of origin	Date(s) of importation	Release data X—released (date) 0—not released ?—release status unknown	Release area(s)	Establishment X—yes (date confirmed) 0—no 1—temporary (inclusive dates)	Literature citation(s)
<i>Sticholotis quadrimaculatus</i> (Blackburn) (as <i>Gymnoscynus quadrimaculatus</i>)	Australia		X (1892)	Southern California	0	Essig (1931)
<i>Sukunahikona bicolor Kamiya</i>	Taiwan	1951	?			J. Hall, pers. comm.
<i>Telsimia emarginata</i> Chapin	China	1924–1925 1947	X (1925) (1948)	California	0	Clausen et al. (1948); K. Hagen, pers. comm.
<i>Telsimia quadristicta</i>	South Africa	1958	?			J. Hall, pers. comm.
<i>Telsimia subviridis</i> (Blackburn) (as <i>Lipernes subviridis</i>)	Australia		X (1892)	Southern California	0	Essig (1931)
<i>Telsimia tetrasticta</i> Casey	Japan	1958	?			J. Hall, pers. comm.
<i>Zagloba aeneipennis</i> (Sicard) (as <i>Scymnus aeneipennis</i>)	Trinidad	1936	X (1936)	California, Florida	0	Dohanian (1937)

Table 2. Species of foreign Coccinellidae recorded from North America (not intentionally introduced).

Species	Probable country of origin	Date(s) of discovery	Area(s) of discovery	Establishment X—certain 0—not estab- lished ?—possibly established	Host(s)	Literature citation(s)
<i>Azya orbigera orbigera</i> Mulsant	? South America		Florida	X (1975)	Scale insects	Woodruff and Sailer (1977); Gordon (1980)
<i>Buleae lichatschovi</i>	?	1922	New Jersey	0	?	Schott (1933)
Hummel	?	1973	New Jersey	X	Aphids	Angalet and Jacques (1975); Angalet (1979)
<i>Coccinella septempunctata</i> L.	?	?	Quebec	X	Aphids	Laroche (1979)
<i>Coccinella undecimpunctata</i> L.	Europe	1912	Massachusetts	X	Aphids	Schaeffer (1912); Brown (1962); Watson (1979); Wheeler and Hoebeke (1981)
<i>Coelophora inaequalis</i> (F.)	?	1965	Washington	X		Russell (1968)
<i>Epilachna varivestis</i> Mulsant	Mexico	1978 1850	Florida New Mexico	? (1982) X	Scale insects Legumes	Specimen data Chittenden and Marsh (1920); Gordon (1976a)
<i>Propylea quatuordecim- punctata</i> (L.)	Europe	1968	Quebec	X	Aphids	Chantial (1972)
<i>Scymnus (Pullus) suturalis</i> Thunberg	Europe	1972	Connecticut, Michigan, Pennsylvania	X	Aphids	Gordon (1982); Hoboeke (in press)
<i>Stethorus punctillum</i> Weise	Europe	1950	Ontario, Massachusetts	X	Mites	Brown (1950)
<i>Subcoccinella vigintiquatuor- punctata</i> (L.)	Europe	1973	Pennsylvania, New Jersey	X	<i>Saponaria officinalis</i> L. (bouncing bet)	USDA (1974); USDA (1975); Wheeler and Henry (1981); Pope (1977)

Coccinella undecimpunctata L.

First discovered in 1912 in Massachusetts, *C. undecimpunctata* has been subsequently reported from the northeastern United States and southern Canada, in the vicinity of the St. Lawrence River and the Great Lakes, and as far north as Newfoundland; also from southern British Columbia. In 1965 it was discovered in the Seattle area of Washington. The native distribution is Eurasian; the North American populations are apparently the result of accidental introductions and subsequent spread.

Cryptognatha nodiceps Marshall

The introductions were made in 1936 and 1938 from Puerto Rico and Trinidad into south Florida (Miami) for use against the coconut scale. The species was recovered in 1940 and again in 1963. It is not certain whether it is actually established or not, but if so, then the population is evidently very low and cannot be considered as having any significant impact on pest populations at the present time. All available records are from the Miami area.

Cryptolaemus montrouzieri Mulsant

The introductions took place in 1891–1892 and 1930 from Australia into California, primarily for control of the citrus mealybug; but *C. montrouzieri* is also a predator of mealybugs of the genus *Pseudococcus* and will attack related genera such as *Phenacoccus* and *Ferrisia* as well as the coccid genus *Pulvinaria*. Insectary reared material from California was released in Florida where the species became established, but attempts failed in Virginia in 1940–1941. A similar attempt also failed in New Orleans, Louisiana, in 1908. *C. montrouzieri* is presently established in California and in central and southern Florida.

Diomus pumilio Weise

This Australian species has become established in California along the coast from the San Francisco Bay area to San Diego, apparently as a result of releases made in 1975 and 1978, although it was first imported and released in 1892. Attempts have been made to establish it in eastern Canada (1958), North Carolina (1959), and Washington (1959–1960), all without success.

Epilachna varivestis Mulsant

The Mexican bean beetle is a native of Mexico that probably migrated north as a result of bean cultivation by Indians. It was first recorded in 1850 from the United States (New Mexico) and later the beetle was discovered at Birmingham, Alabama, in 1918. This latter introduction may have been a result of shipments of hay from the west. It now occurs from Quebec south to Florida, west to Idaho and to the Mexican border.

Exochomus flavipes (Thunberg)

Several attempts have been made to establish *E. flavipes* in California over the years, but only an introduction from South Africa in 1978 succeeded, although

tenuously. The beetle was introduced for control of *Pulvinariella mesembryanthemi* (Vallot) and *Pulvinaria delottoi* Gill, 2 species of scales on ice plant. *E. flavipes* now occurs in the San Francisco Bay area.

Exochomus metallicus (Korschefsky)

This species is now established in Ventura County, California, from material introduced from Eritrea, Ethiopia, in 1954 for control of the citricola and black scales. Clausen et al. (1978) state that it is presently found in infestations of the citrus mealybug on host plants other than citrus.

Exochomus quadripustulatus (L.)

First introduced into Massachusetts from Europe in 1905–1906 for control of various lecaniine coccids; it was also imported into California from Italy in 1915, and 1927–1928. No establishment resulted from three Massachusetts releases, but it is now established in California where it feeds on several species of scale insects.

Halmus chalybeus (Boisduval)

This species was introduced into California as *Orcus chalybeus* from Australia in 1892 by Koebele and has been established in coastal southern California since. It was released on the black scale and will develop on both lecaniine and diaspine coccids. At present it is found mostly in infestations of the California red scale.

Harmonia dimidiata (F.)

The initial introduction as *Leis dimidiata* was from south China into California in 1924. It was released in 1925 for aphid control, but did not become established. A shipment sent to Florida from California in 1925 was released in 1926 with establishment resulting. In 1959 it was introduced into Oregon from India for control of the balsam woolly adelgid but did not become established. At present *H. dimidiata* occurs only in Florida.

Hyperaspis senegalensis hottentota Mulsant

This species was introduced into California from South Africa in 1978 for control of scales on ice plant. It presently occurs in the San Francisco Bay area but "has only a tenuous foothold" (Tassan et al., 1982).

Nephus (Sidis) binaevatus (Mulsant)

This species was introduced into California from South Africa in 1921 for control of various mealybug species. It was released in 1922 and became established. At present it occurs only in coastal and southern California.

Propylea quatuordecimpunctata (L.)

In 1968 a population of this palearctic species was discovered in the vicinity of Montreal, Quebec, where it is apparently well established but still localized. Attempts to establish this species in the United States from 1971 to 1982 were unsuccessful.

Rhyzobius forestieri (Mulsant)

This species has been misidentified as *Rhyzobius ventralis* Erichson, but Pope (1981) corrected the long standing error. The true *R. ventralis* was among material sent from Australia to California by Koebele in 1889, but did not become established. In 1892, another shipment thought to be "*R. ventralis*" was sent to California by Koebele, this time the releases became established the same year. This second shipment was composed of *R. forestieri* (Pope, 1951), a predator of the black scale on various plants. The beetle is presently known only from California.

Rhyzobius lophanthae (Blaisdell)

Rhyzobius lophanthae (formerly *Lindorus lophanthae*) was first introduced from Australia and established in 1892 for use against the black scale in California. It preys on various species of Coccidae, but especially on diaspidines. The present distribution throughout most of the southern United States may be a result of introductions from California stock or subsequent unrecorded releases. Cressman (1933) recorded *R. lophanthae* from New Orleans, Louisiana, as an effective predator of *Chrysomphalus dictyospermi* (Morgan); however, he gave no indication of introduction as being the population source. This species was also imported from South Africa in 1959 and released in Texas, but it may already have been established there.

Rodolia cardinalis (Mulsant)

The vedalia beetle, *Rodolia cardinalis*, is the most famous introduced beneficial insect in history. Koebele sent it from Australia to California in 1888–1889 for use against the cottony cushion scale. It immediately became established and achieved a startling success that led to the wholesale introduction of many other ladybird beetles from Australia in ensuing years. At present it is established in California, south Texas, Louisiana, and Florida.

Scymnus (Pullus) impexus Mulsant

Scymnus impexus has been introduced into Canada and the United States from Germany several times for control of the balsam woolly adelgid. It was released in New Brunswick, Newfoundland, and Nova Scotia each year between 1951 and 1960, and persisted in small numbers through 1959. Early releases in British Columbia apparently were unsuccessful, but success was achieved from releases in 1960 and 1961 in the Willamette Valley of Oregon. In North Carolina this beetle may have become marginally established from releases in the early 1960's, but at present this cannot be documented.

Scymnus (Pullus) suturalis Thunberg

The first specimens reported from the United States were collected in Pennsylvania in 1972, but misidentified as *Scymnus (Pullus) coniferarum* Crotch (Gordon, 1976b). Subsequently the true identity was discovered (Gordon, 1982). The species is widely distributed in Pennsylvania with additional records from New York, Michigan, and Connecticut. The probable origin of this species is northern Europe possibly arriving

with imported nursery stock. *S. (P.) suturalis* was released in Michigan in 1961, but whether the present Michigan populations result from that release cannot be documented.

Stethorus punctillum Weise

Stethorus punctillum, a European species of this mite-feeding genus, was first reported in 1950 from Ontario and Massachusetts. It is now known to occur in eastern North America from Massachusetts west to Wisconsin. In the west it occurs in western Oregon, Washington, and Idaho.

Subcoccinella vigintiquatuorpunctata (L.)

This is one of 2 nonpredaceous (phytophagous) foreign coccinellids established in North America. In the Old World *S. 24-punctata* is a serious pest of alfalfa. In North America it apparently will not feed on alfalfa; instead it feeds primarily on bouncing bet, *Saponaria officinalis* L. (Caryophyllaceae). The initial discovery of this species was made in 1973, in Bergen Co., New Jersey. A subsequent survey in the eastern states showed that the beetle was much more widespread and must have been established long before 1973. It is now known from 7 states: Illinois, Maryland, New Jersey, New York, Ohio, Pennsylvania, and West Virginia.

The following tables list all known introductions of foreign Coccinellidae. Table 1 deals with those intentionally imported, whether released or not, and Table 2 lists those species accidentally introduced and established. The species are listed under the currently accepted name or combination, with the name it was introduced under in parentheses. The dates of importation and release are given if known with the areas of release listed in the next column. The literature citations are those from which the information presented for each species was gleaned. The tables were compiled from various literature sources beginning with Essig (1931). The major sources utilized for the period from 1931 to date were the California Biological Control Reports; Clausen (1956b); Canadian Insect Pest Review; Clausen et al. (1978). In addition, I am indebted to the following individuals for information and assistance: K. Hagen, University of California, Berkeley, Division of Biological Control, Albany; R. Dysart and P. Schaefer, USDA Beneficial Insects Research Laboratory, Newark, Delaware; J. Hall, Division of Biological Control, University of California, Riverside; J. Coulson, USDA, Beneficial Insect Introduction Laboratory, Beltsville, Maryland; R. Fye, USDA Yakima Agricultural Research Laboratory, Yakima, Washington; J. Kelleher, Pesticide Information Liaison Section, Research Branch, Agriculture Canada, Ottawa; R. Woodruff, Florida Department of Agriculture, Gainesville, Florida.

SYSTEMATIC TREATMENT

Family Coccinellidae

Coccinellidae Latreille, 1807, p. 70—Westwood, 1839, p. 395—Crotch, 1874b, p. 53—Weise, 1885a, p. 3—Casey, 1899, p. 71—Mader, 1926, p. 1—Korschefsky, 1931, p. 3—Wingo, 1952, p. 16—J. Chapin, 1974, p. 12—Belicek, 1976, p. 288.

Form usually oval to round, convex, sometimes elongate oval and weakly convex.

Antenna usually 11-segmented, often reduced to 10, 9, 8, or 7 segments, more or less clubbed. Apical segment of maxillary palpus triangular (securiform), or parallel sided, or conical. Elytron not truncate, not striate. Prosternal process distinctly separating transverse front coxae. Mesepimeron reaching middle coxal cavity. Abdomen with 5 or 6 visible sterna, 7th rarely visible. First sternum of abdomen nearly always with postcoxal line. Tarsus usually cryptotetramerous, often trimerous, rarely truly tetramerous. Tibial spurs present or absent. Tarsal claw simple or toothed. Male genitalia with sclerotized siphon (aedeagus), trilobed phallobase.

The cryptotetramerous tarsi and presence of postcoxal lines on the first abdominal sternum will usually enable a coccinellid to be recognized as such. In those species which lack postcoxal lines, the maxillary palpi are strongly securiform and the tarsi are cryptotetramerous. The curved, sclerotized aedeagus (the siphon) is a certain character for family recognition.

KEY TO SUBFAMILIES OF COCCINELLIDAE NORTH OF MEXICO

1. Clypeus expanded laterally, shelflike, partially dividing eye (Fig. 3a); dorsal surface not pubescent Chilocorinae (p. 602)
- Clypeus not expanded laterally, or if so, briefly and not shelflike; dorsal surface pubescent or not 2
- 2(1). Mandible multidenticulate apically (Fig. 3c); antenna 11-segmented, inserted dorsally (Fig. 3b); dorsal surface pubescent; plant leaf feeders Epilachninae (p. 862)
- Mandible rarely multidenticulate apically, if so, then length less than 3.0 mm; antenna 11-segmented or not, insertion variable; dorsal surface pubescent or not; not plant leaf feeders 3
- 3(2). Apical segment of maxillary palpus conical or elongate oval (Fig. 3d); mentum narrowly articulated with submentum; length less than 3.0 mm; middle coxal cavities broadly separated by articulation of meso- and metasterna Sticholotidinae (p. 34)
- Apical segment of maxillary palpus divergent apically (securiform) or nearly parallel sided, rarely slightly convergent apically; mentum not narrowly articulated with submentum; length often more than 2.0 mm; middle coxal cavities narrowly separated except broadly separated in Scymninae 4
- 4(3). Antenna short, $\frac{2}{3}$ or less as long as head width; apical segment of maxillary palpus usually parallel sided or barrel shaped (Fig. 3d, e), rarely securiform; middle coxal cavities broadly separated Scymninae (p. 74)
- Antenna long, usually more than $\frac{2}{3}$ as long as head width; apical segment of maxillary palpus securiform (Fig. 3f); middle coxal cavities narrowly separated 5
- 5(4). Dorsal surface pubescent Coccidulinae (p. 654)
- Dorsal surface glabrous Coccinellinae (p. 678)

Subfamily Sticholotidinae

Sticholotidinae Gordon, 1977, p. 186 (emendation).

Sticholotinae Weise, 1901, p. 430—Sasaji, 1967, p. 2—Sasaji, 1968, p. 19—J. Chapin, 1974, p. 13.

Small to medium-sized Coccinellidae; form hemispherical or elliptical. Functional wings present or absent. Dorsally pubescent or not. Head with apical segment of maxillary palpus more or less tapered, conical, barrel shaped or elongate oval; men-

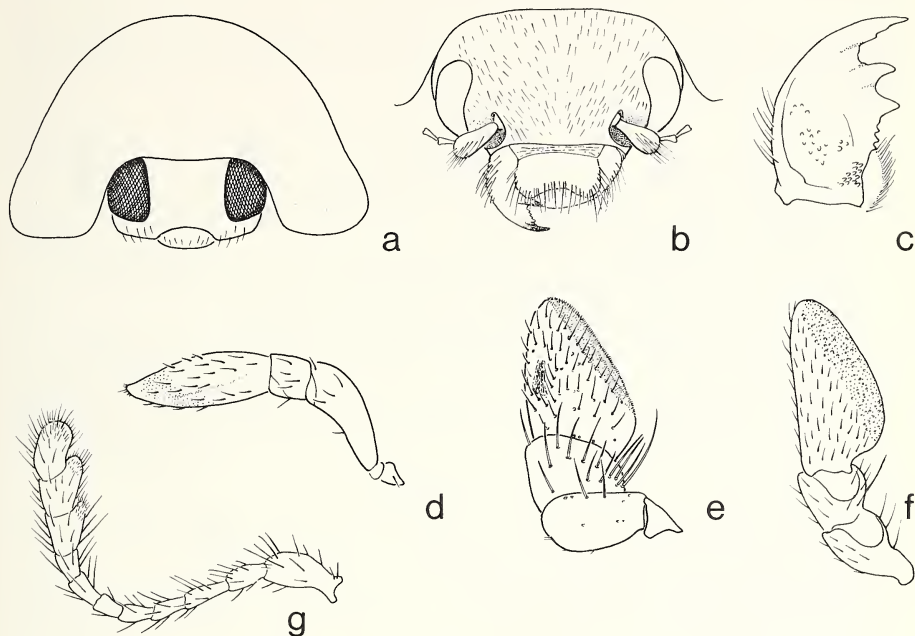


Fig. 3. a. Head of *Chilocorus* sp. b. Head of *Epilachna* sp. c. *Epilachna* mandible. d. *Microwisea* maxillary palpus. e. *Hyperaspis* maxillary palpus. f. *Coccinella* maxillary palpus. g. *Coccidula* antenna.

tum and submentum narrowly joined. Antenna usually inserted dorsally, with 7 to 11 segments, club with 1 to 5 segments. Pronotum sometimes with line or ridge separating anterior angle from disc. Anterior coxal cavities open behind. Middle coxal cavities broadly separated. Metendosternum with very broadly separated anterior tendons. Abdomen with 5 or 6 visible sterna; male 9th sternum flat. Tarsus trimerous or cryptotetramerous. Female genital plate elongate, triangular.

The subfamily is principally characterized by the form of the terminal segment of the maxillary palpus which is not securiform or distinctly broadened apically as is typical of the rest of the Coccinellidae. The form of the maxillary palpus is an excellent distinguishing character for members of the Serangiini, Microweisini, and Cephaloscymnini, but some members of tribes not occurring north of Mexico have that segment more or less enlarged, approaching the typical coccinellid type. Members of this subfamily are found throughout the tropical regions of the world with some genera and species occurring also in temperate regions. The New World members of Sticholotidinae were treated by Gordon (1977); see that paper for detailed discussion of taxonomy, phylogeny and zoogeography. The Cephaloscymnini, new tribe, was not recognized as belonging in this subfamily when that paper (1977) was prepared, and therefore they were not included. The detailed study of the morphology of the genus *Cephaloscymnus* required for this study showed that *Cephaloscymnus* and

related genera must be transferred to Sticholotidinae and a new tribe erected for them. With this addition the tribes representing the subfamily north of Mexico are Serangiini, Microweisini, and Cephaloscymnini.

KEY TO TRIBES OF STICHOLOTIDINAE

1. Antennal club composed of a single knife-shaped or elongate-oval segment (Fig. 25b); femur broad, flat, fitting into depressions on ventral surface; prosternum greatly expanded to conceal mouthparts (Fig. 25a) Serangiini
- Antennal club composed of more than a single segment or if only one, then segment not knife-shaped; femur not broad or flat, ventral surface without depressions for legs; prosternum not greatly expanded, not concealing mouthparts 2
- 2(1). Dorsal surface pubescent; head large, exposed, directed ventrally; eye large, narrow, elongate (Fig. 30a) Cephaloscymnini
- Dorsal surface apparently glabrous; head small, at least slightly concealed under pronotum, usually directed forward; eye small, round or oval (Fig. 4a) .. Microweisini

Tribe Microweisini

Microweisini Leng, 1920, p. 213—Wingo, 1952, p. 19—J. Chapin, 1974, p. 14—Sasaji, 1968, p. 20—Gordon, 1977, p. 200.

Pharini Casey, 1899, p. 110—Korschefsky, 1931, p. 209—Pope, 1962, p. 267 (in part) (type-genus preoccupied).

Sticholotidinae with dorsal surface usually not pubescent; if so, then hairs of uniform length; size minute. Head capsule with prolonged frons and clypeus emarginate around antennal insertion (Fig. 4a); eye small, facets ranging from extremely coarse to fine. Mandible without apical or basal teeth. Apical segment of maxillary palpus slender, tapered at apex (Fig. 4b). Antenna 7 to 10-segmented. Pronotum with oblique anterolateral line inside anterolateral angle (Fig. 4c) (except *Gnathowisea schwarzi*). Intercoxal process of prosternum broad, with anterior lobe (Fig. 4d). Leg simple, tibia unmodified. Tarsus cryptotetramerus or trimerous. Functional wing present. Abdomen with 6 visible sterna; basal sternum with divided postcoxal line (Fig. 4g). Male genitalia asymmetrical, phallobase with unpaired, basal apodeme (Fig. 8a). Female spermathecal capsule bulbous (Fig. 8d).

This tribe is represented by 8 genera that occur from southern Canada to Chile and Argentina and is apparently restricted to the Western Hemisphere. Microweisini is a closely knit group of genera agreeing quite well in all essential characteristics. The small size, characteristic habitus, the almost universal presence of an anterolateral line on the pronotum, divided postcoxal line and broad T-shaped intercoxal process of the prosternum serve to diagnose this tribe. See Gordon (1977) for a discussion of all Western Hemisphere genera.

KEY TO GENERA OF MICROWEISINI

1. Head entirely concealed beneath pronotum (Fig. 20d) *Nipus* Casey
- Head partially or not at all concealed 2
- 2(1). Head deeply inserted in prothorax, extremely elongate, slender (Fig. 15a) *Gnathowisea* Gordon
- Head not deeply inserted in prothorax, not elongate (Fig. 4a) 3

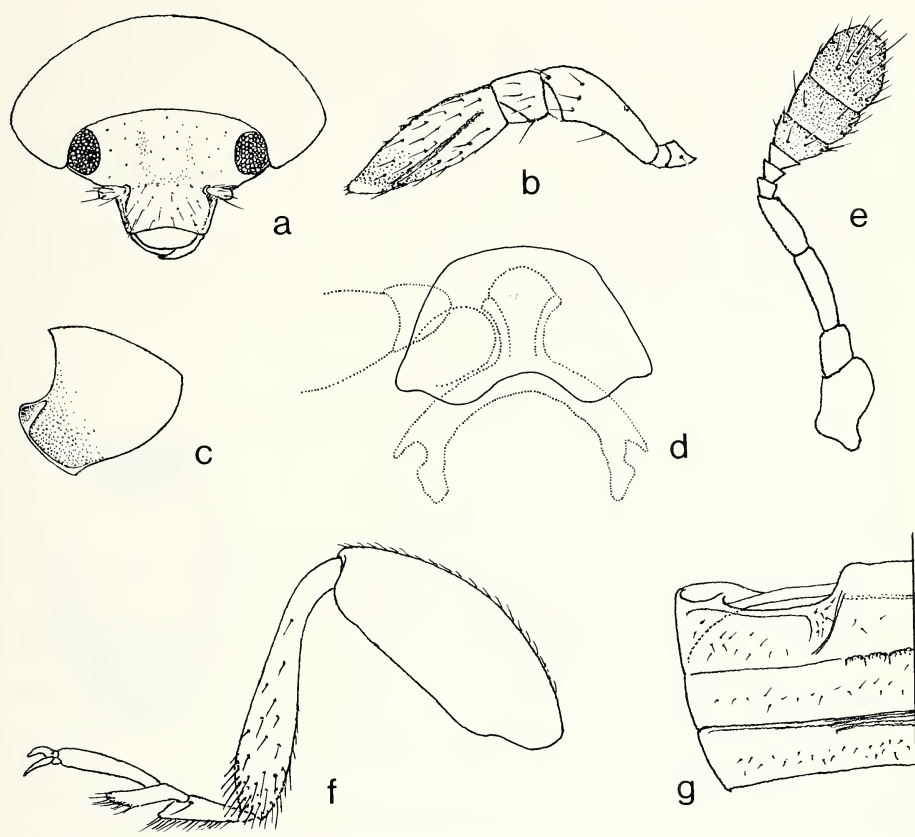


Fig. 4. *Microweisea* sp. a. Head. b. Maxillary palpus. c. Pronotum. d. Posternum. e. Antenna. f. Leg. g. Postcoxal line.

- 3(2). Antenna with 3-segmented club (Fig. 4e) *Microweisea* Cockerell
 – Antenna with 2-segmented club (Fig. 12a) *Coccidophilus* Brethes

Genus *Microweisea* Cockerell

Microweisea Cockerell, 1903, p. 38 (new name for *Epismilia* Cockerell, 1900)—Wingo, 1952, p. 19—Pope, 1962, p. 637—J. Chapin, 1974, p. 15—Belicek, 1976, p. 296—Gordon, 1970d, p. 207—Gordon, 1977, p. 204. Type-species; *Smilia felschei* Weise, by monotypy.

Smilia Weise, 1891, p. 288 (not Germar, 1833)—Horn, 1895, p. 82—Blatchley, 1910, p. 524.

Epismilia Cockerell, 1900, p. 606 (not Fromental, 1861) (new name for *Smilia* Weise).

Pseudoweisea Schwarz, 1904, p. 118 (name made available by accident).

Microweisini with form elongate, oval; dorsum glabrous. Head slightly prolonged

anterior to antennal insertion (Fig. 4a); eyes separated by 4 times the width of an eye. Apical segment of maxillary palpus elongate, slender, conical. Antenna with 7-segmented scape, 3-segmented club (Fig. 4e). Prosternum with small anterior lobe. Tarsus trimerous (Fig. 4f). Male genitalia asymmetrical, paramere reduced (Fig. 5a).

There are 5 species of this genus described from north of Mexico, and I am aware of several undescribed species from Mexico and South America. Members of *Microweisea* are scale predators with available host records as follows; *Lepidosaphes beckii* (Newman), *Lepidosaphes* sp., *Melanaspis obscura* (Comstock), *Chionaspis pinifoliae* (Fitch), *Pseudaonidia duplex* (Cockerell), and *Quadraspidiotus perniciosus* (Comstock). The North American species of *Microweisea* were taxonomically treated by Gordon (1970d).

KEY TO SPECIES OF *Microweisea*

1. Elytron with a transverse median yellow or yellowish red band (Fig. 10d) *coccidivora* (Ashmead)
- Elytron without a transverse median yellow band 2
- 2(1). Species occurring in California 3
- Species not occurring in California 4
- 3(2). Elytron light yellowish brown, suture narrowly piceous; head and pronotum piceous; surface of pronotum dull, strongly alutaceous *suturalis* (Schwarz)
- Elytron usually dark brown or piceous; unicolorous with head and pronotum; surface of pronotum somewhat shiny, feebly alutaceous *misella* (LeConte)
- 4(2). Form extremely elongate (Fig. 11d); pronotum brown or yellowish brown, paler on anterolateral angle than on disc; Florida *ovalis* (LeConte)
- Form not extremely elongate; pronotum dark brown or piceous, anterolateral angle not paler than disc; not restricted to Florida 5
- 5(4). Pronotum distinctly punctured; head strongly alutaceous; distributed from southern Canada to Florida and Mexico *misella* (LeConte)
- Pronotum without apparent punctures; head shiny, not or very feebly alutaceous; Texas *minuta* (Casey)

Microweisea suturalis (Schwarz)

Fig. 5a–d; Map, Fig. 9

Pseudoweisea suturalis Schwarz, 1904, p. 118.

Microweisea suturalis: Leng, 1920, p. 213—Gordon, 1970d, p. 209.

Pentilia suturalis: Korschefsky, 1932, p. 225.

Diagnosis. Length 1.0 to 1.10 mm, width 0.90 to 0.95 mm. Color piceous; elytron yellowish brown, elytral suture narrowly piceous (Fig. 5d), ventral surface brown. Male genitalia as in Figure 5a–c.

Discussion. *M. suturalis* occurs only in California. The only species with which it might be confused is *M. misella*, but *M. misella* usually has a uniformly dark dorsal surface and the pronotum is mostly shiny and alutaceous; the pronotum of *M. suturalis* is strongly alutaceous, dull. The holotype is a male specimen in the USNM collection.

Type locality. Long Beach, California.

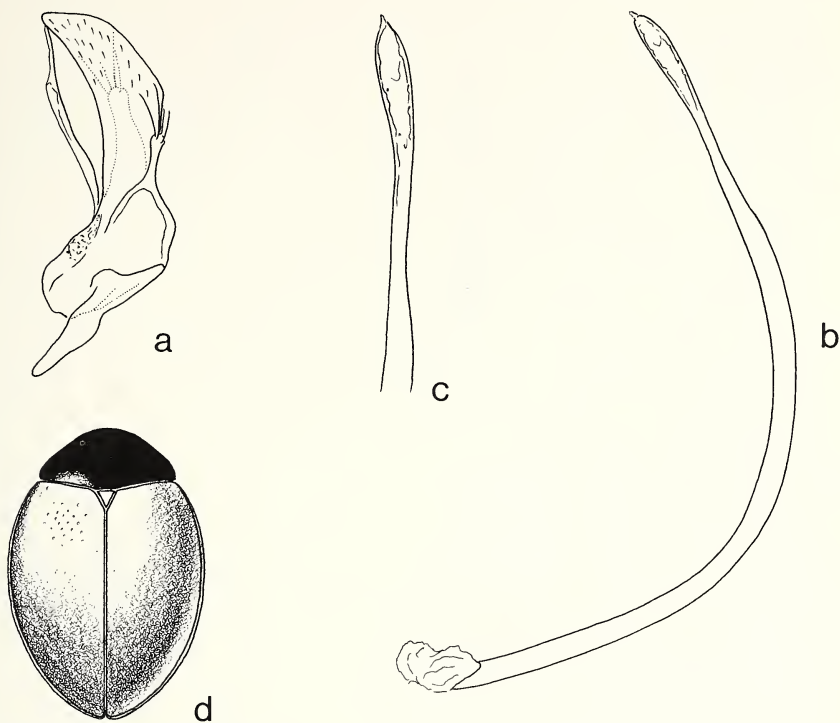


Fig. 5. *Microweisea suturalis*.

Type depository. USNM (7936).

Distribution. Figure 9. CALIFORNIA: Long Beach; Los Angeles Co.

Microweisea minuta (Casey)

Fig. 6a-c; Map, Fig. 7

Smilia minuta Casey, 1899, p. 135.

Epismilia minuta: Cockerell, 1900, p. 606.

Microweisea minuta: Cockerell, 1903, p. 38—Leng, 1920, p. 213—Gordon, 1970d, p. 211.

Pentilia caseyi Korschefsky, 1931, p. 223 (unnecessary replacement name for *minuta* Casey).

Diagnosis. Length 0.85 to 0.88 mm, width 0.55 to 0.60 mm. Color piceous, ventral surface dark brown. Male genitalia as in Figure 6a-c. The small size will usually distinguish this species; see remarks under *M. misella*. The type of *M. minuta* is a unique male in the Casey collection which must be considered the holotype.

Type locality. Austin, Texas, on the Colorado River above Columbus.

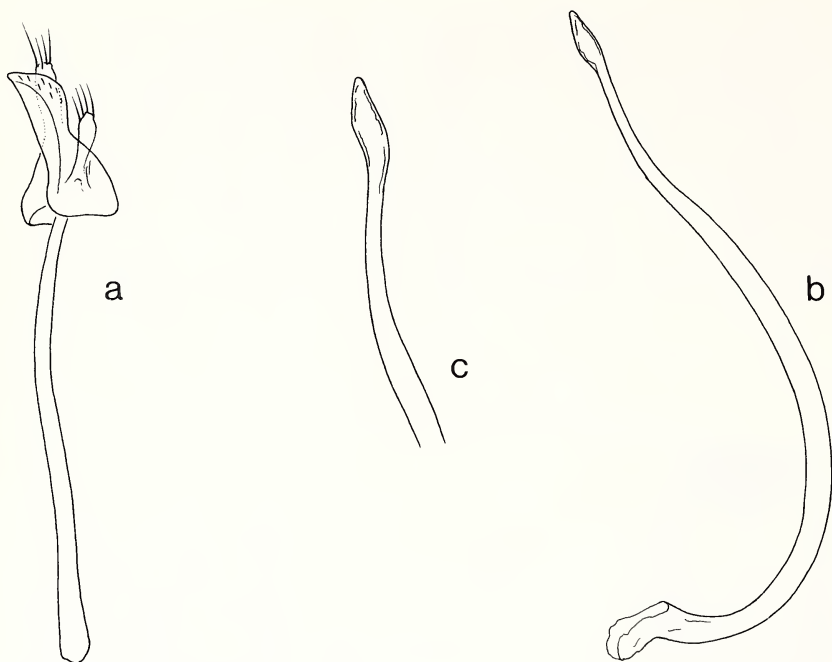


Fig. 6. *Microwisea minuta*.

Type depository. USNM (35241).

Distribution. Figure 7. TEXAS: Austin; Brownsville; San Diego, Sinton.

Microwisea misella (LeConte)

Fig. 8a–d; Map, Fig. 9

Pentilia misella LeConte, 1878a, p. 400—Korschefsky, 1931, p. 224.

Smilia misella: Horn, 1895, p. 82—Casey, 1899, p. 135—Blatchley, 1910, p. 524.

Epismilia misella: Cockerell, 1900, p. 606.

Microwisea misella: Cockerell, 1903, p. 38—Leng, 1920, p. 213—Wingo, 1952, p. 19—Gordon, 1970d, p. 211—J. Chapin, 1974, p. 15—Belicek, 1976, p. 297.

Diagnosis. Length 0.98 to 1.45 mm, width 0.70 to 1.05 mm. Color entirely piceous. Male genitalia as in Figure 8a–c. Female genitalia as in Figure 8d.

Discussion. This is the most widely distributed member of the genus, having been recorded from most areas of the United States and part of southern Canada. This species and *M. minuta* are similar in appearance, but *M. misella* has distinct pronotal punctures that are lacking in *M. minuta*, and nearly all specimens of *M. misella* are obviously larger than the largest specimens of *M. minuta*. The male genitalia afford a certain means of separating these 2 species. There are 8 specimens in the LeConte collection that I consider types, the first of these, a male labeled “D.C./Type 6702

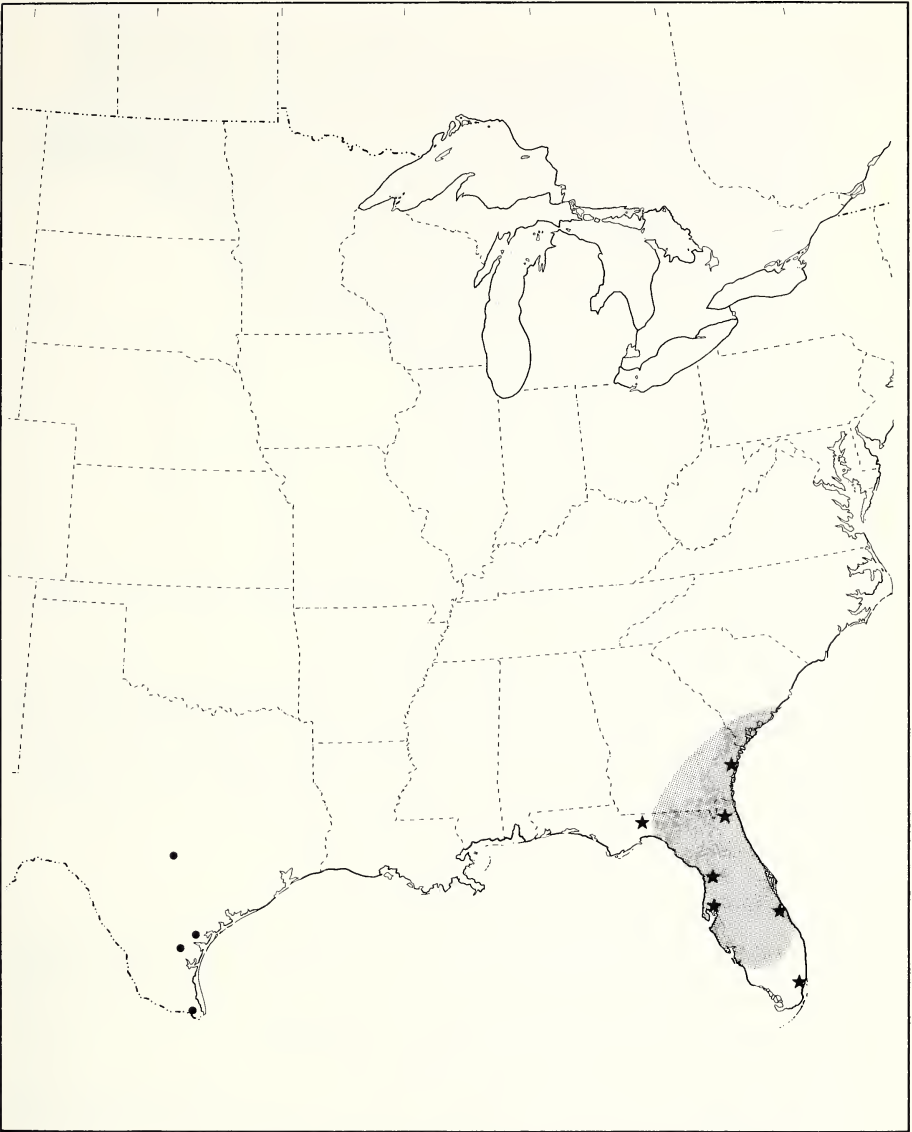


Fig. 7. Distribution. *M. minuta* (dot); *M. coccidivora* (shaded); *M. ovalis* (star).

(red paper)/pentilia misella Zim.”, I designate and label the lectotype. The remaining 7 specimens are designated as paralectotypes.

Type locality. Washington, D.C. (lectotype here designated).

Type depository. MCZ.

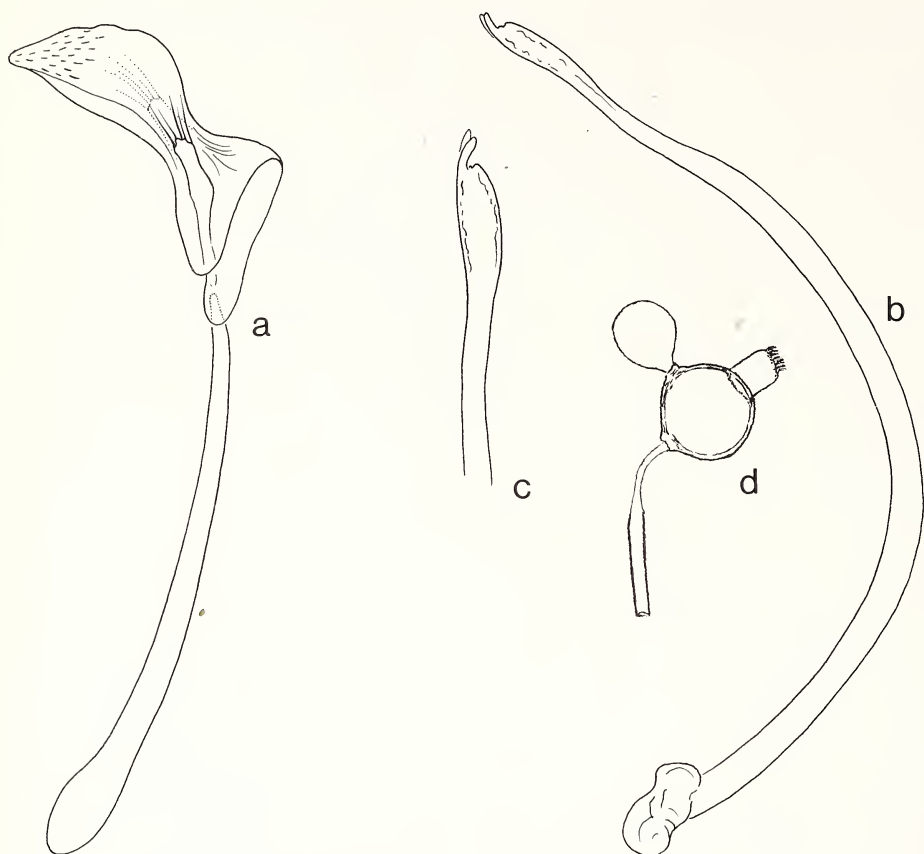


Fig. 8. *Microweisea misella*.

Distribution. Figure 9. Southeastern Canada to Florida and east Texas, west to British Columbia and northern California.

Microweisea coccidivora (Ashmead)

Fig. 10a-d; Map, Fig. 7

Hyperaspidius coccidivora Ashmead, 1880, p. 10.

Smilia coccidivora: Horn, 1895, p. 82—Casey, 1899, p. 135.

Epismilia coccidivora: Cockerell, 1900, p. 606.

Microweisea coccidivora: Cockerell, 1903, p. 38—Leng, 1920, p. 213—Gordon, 1970d, p. 212.

Pentilia coccidivora: Korschefsky, 1931, p. 223.

Diagnosis. Length 0.80 to 1.0 mm, width 0.60 to 0.70 mm. Color yellowish red; elytral base and apex dark brown, transverse median area yellowish brown (Fig. 10d), ventral surface and leg yellowish brown. Male genitalia as in Figure 10a-b.

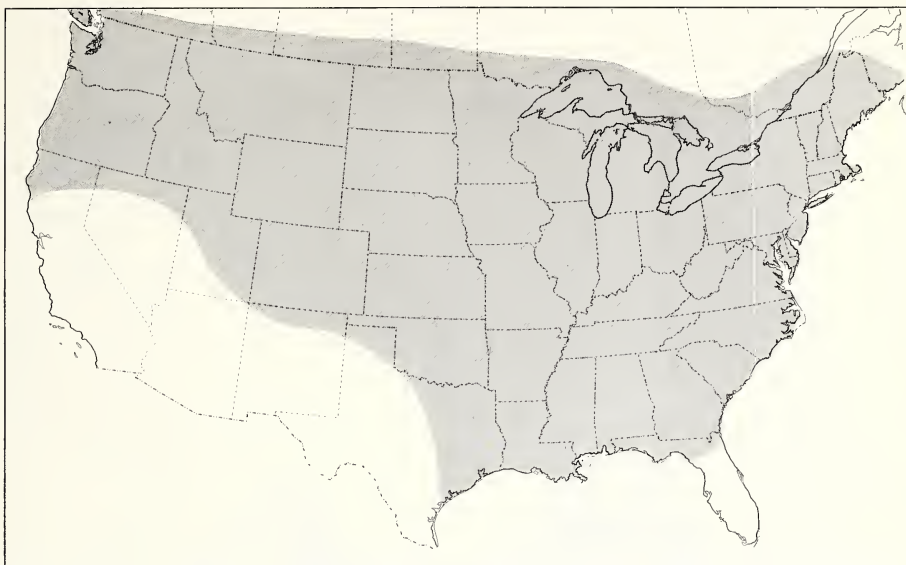


Fig. 9. Distribution. *Microwisea misella* (shaded); *M. suturalis* (dot).

Discussion. This is the only described species of the genus possessing a distinctive dorsal color pattern which allows it to be easily recognized.

Type locality. Orlando, Florida (neotype designated by Gordon, 1970d).

Type depository. USNM (70409).

Distribution. Figure 7. Florida; Georgia; South Carolina.

Microwisea ovalis (LeConte)

Fig. 11a-d; Map, Fig. 7

Pentilia ovalis LeConte, 1878a, p. 400—Korschefsky, 1932, p. 225.

Smilia ovalis: Horn, 1895, p. 82.

Epismilia ovalis: Cockerell, 1900, p. 66.

Microwisea ovalis: Cockerell, 1903, p. 38—Leng, 1920, p. 213—Gordon, 1970d, p. 213.

Smilia felschei Weise, 1891, p. 288—Horn, 1895, p. 82.

Microwisea felschei: Leng, 1920, p. 13.

Diagnosis. Length 0.95 to 1.05 mm, width 0.50 to 0.63 mm. Form extremely elongate (Fig. 11d). Color brown; elytral suture piceous, anterior pronotal angle, venter, and leg yellowish brown. Male genitalia as in Figure 11a-c.

Discussion. The elongate form and pale pronotum distinguish *M. ovalis* from *M. suturalis* which it most nearly resembles. LeConte had more than one type specimen, but only one remains in his collection. This male labeled "Haulover, Fla, II-10/977/ Type 6699(red paper)/*Pentilia ovalis* Lec." is designated and labeled the lectotype. Type specimen(s) of *S. felschei* have not been examined.

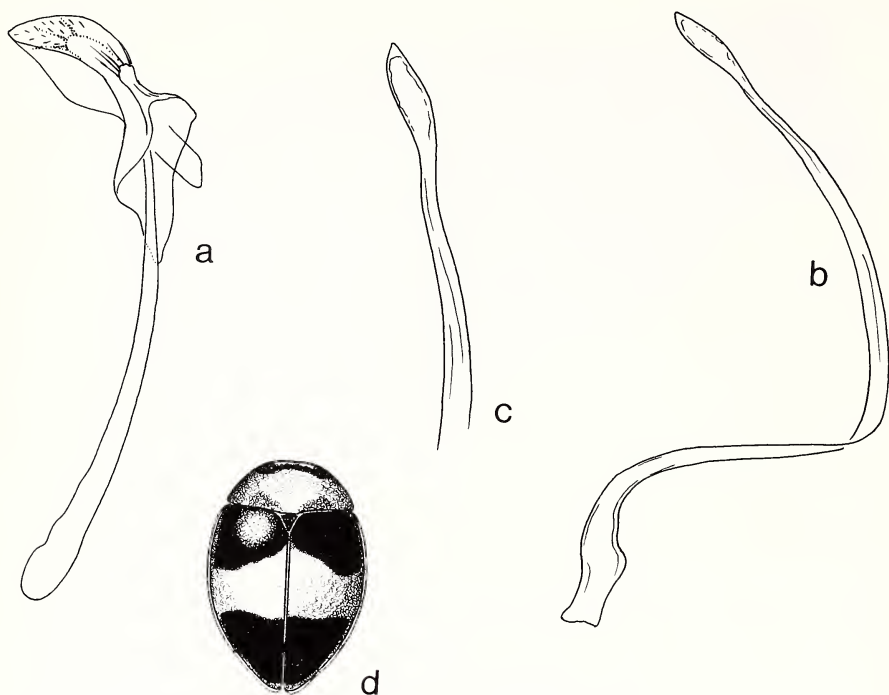


Fig. 10. *Microweisea coccidivora*.

Type locality. Of *ovalis*, Haulover, Florida (lectotype here designated); of *felschei*, Florida.

Type depository. Of *ovalis*, MCZ; of *felschei*, probably MNHUB (not examined).

Distribution. Figure 7. FLORIDA: Baldwin; Biscayne; Citrus City; Haulover; St. Lucie; Tallahassee; Tampa. GEORGIA: Sapelo Island.

Genus *Coccidophilus* Brethes

Coccidophilus Brethes, 1905, p. 76—Costa Lima, 1941, p. 409—Pope, 1962, p. 628—Gordon, 1970d, p. 213—Gordon, 1977, p. 203. Type-species; *Coccidophilus citricola* Brethes, by monotypy and original designation.

Cryptoweisea Gordon, 1970d, p. 213—Gordon, 1977, p. 215. Type-species; *Pentilia marginata* LeConte, by original designation.

Diagnosis. Microweisini with form elongate, oval; dorsum apparently glabrous. Head slightly prolonged anterior to antennal insertion; eyes separated by 4 times the width of an eye; frons often with 2 interocular depressions. Apical segment of maxillary palpus elongate, conical (Fig. 12b). Antenna with 7-segmented scape and 2-segmented club (Fig. 12a). Prosternum with small anterior lobe (Fig. 12c). Tarsus trimerous. Male genitalia asymmetrical, paramere reduced (Fig. 12e).

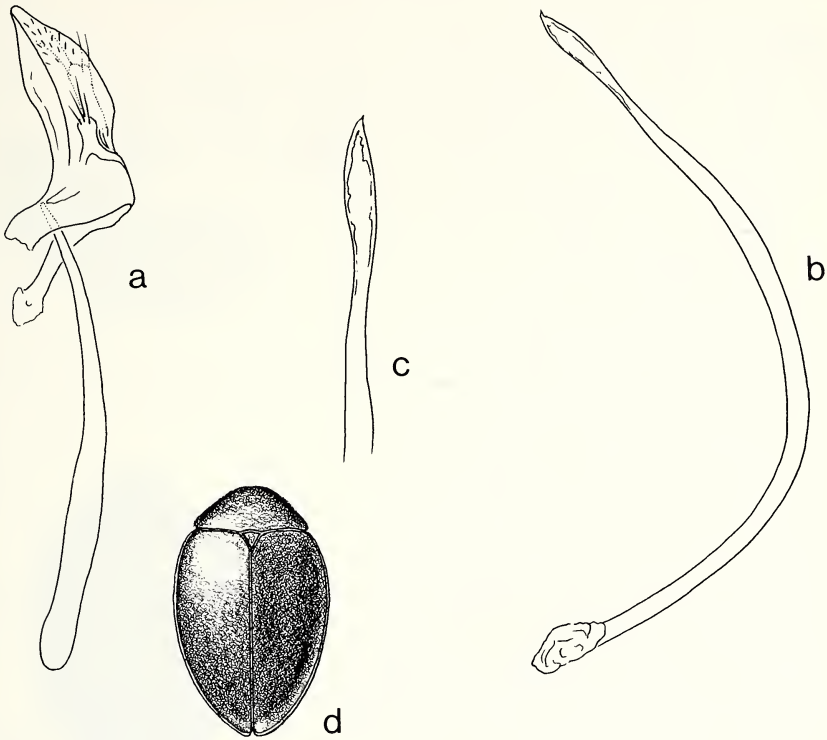


Fig. 11. *Microweisea ovalis*.

Discussion. There are 4 described species in this genus and 2 of these occur north of Mexico. It is difficult to separate *Coccidophilus* from *Microweisea* without counting the antennal club segments, but species of *Coccidophilus* often have 2 depressions on the frons between the eyes. These depressions are quite apparent in *C. marginata*, but feeble and difficult to detect in *C. atronitens*. Members of *Coccidophilus* are scale predators with available host records as follows: *Chionaspis pinifoliae* (Fitch), *Lepidosaphes beckii* (Newman); *Aspidiotus* sp.; *Aonidiella aurantii* (Maskell); *Pseudaulacaspis pentagona* (Targioni-Tozzetti); *Chrysomphalus aonidum* (L.). The North American species of *Coccidophilus* were taxonomically treated by Gordon (1970d) under the generic name of *Cryptoweisea*.

KEY TO SPECIES OF *Coccidophilus*

- 1. Punctures on elytron coarse, dense, separated by the diameter of a puncture or less; form slender, elongate (Fig. 14d); northern and eastern U.S. and southeastern Canada *marginata* (LeConte)
- Punctures on elytron fine, separated by 2 or 3 times the diameter of puncture; form oval (Fig. 12d); western United States *atronitens* (Casey)

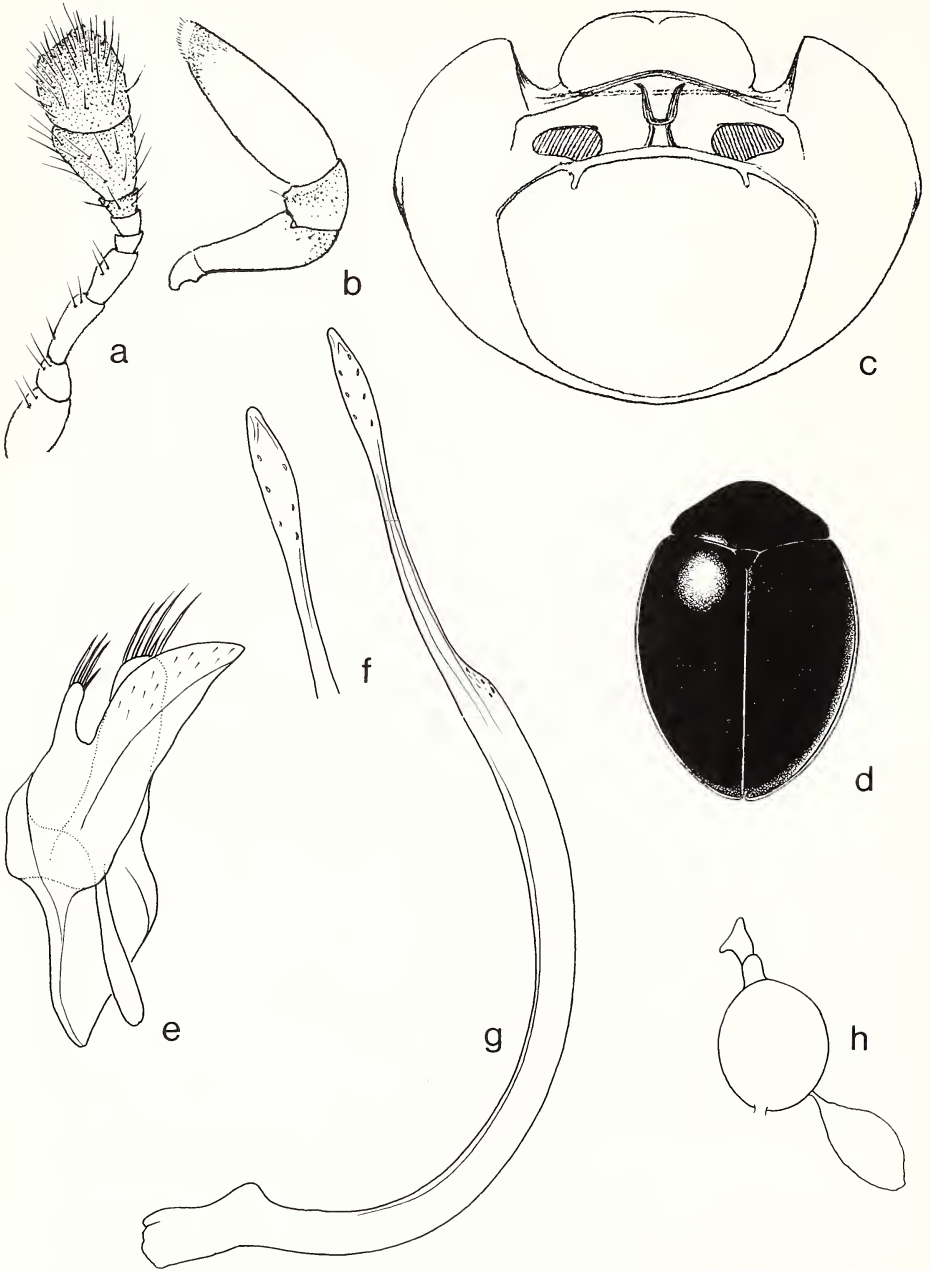


Fig. 12. *Coccidophilus* sp. a. Antenna. b. Maxillary palpus. c. Prosternum. d-h. *Coccidophilus atronitens*.

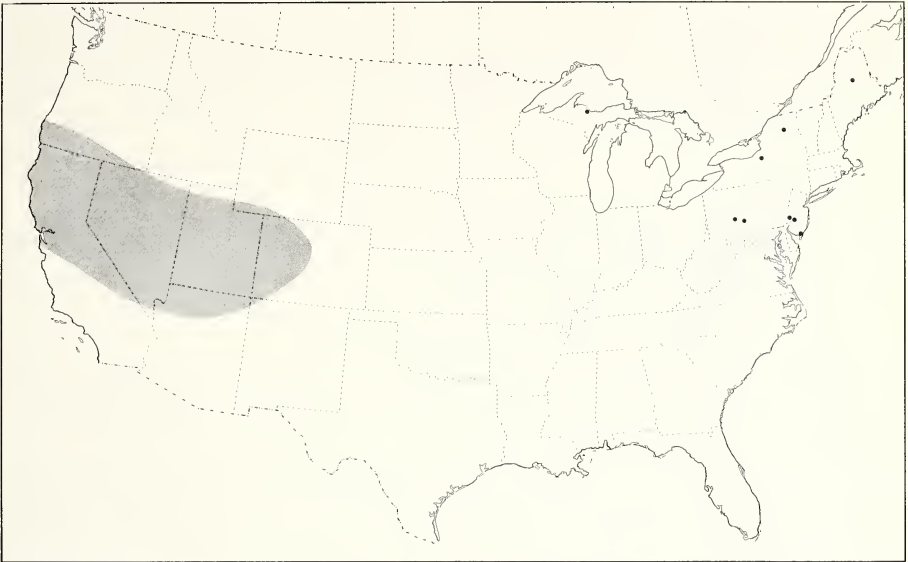


Fig. 13. Distribution. *Coccidophilus atronitens* (shaded); *C. marginata* (dot).

Coccidophilus atronitens (Casey)

Fig. 12d–h; Map, Fig. 13

Smilia atronitens Casey, 1899, p. 135.

Epismilia atronitens: Cockerell, 1900, p. 606.

Microwisea atronitens: Cockerell, 1903, p. 38—Leng, 1920, p. 213.

Pentilia atronitens: Korschefsky, 1931, p. 223.

Cryptowisea atronitens: Gordon, 1970d, p. 215.

Coccidophilus atronitens: Gordon, 1977, p. 187.

Smilia reversa Fall, 1901, p. 231.

Microwisea reversa: Leng, 1920, p. 213.

Diagnosis. Length 1.10 to 1.20 mm, width 0.90 to 0.95 mm. Form oval (Fig. 12d). Color dark brown; epipleuron and leg yellowish brown. Male genitalia as in Figure 12e–g. Female genitalia as in figure 12h.

Discussion. This species is smoother, more polished in appearance than *C. marginata*, and the dorsal punctation is very fine rather than coarse as in *C. marginata*. The 2 species are strongly allopatric. There are 6 types of *S. atronitens* in the Casey collection, all from the same locality. The first of these, a female, is here designated and labeled the lectotype, the remainder are designated and labeled as paralectotypes. Type specimens of *S. reversa* are in the Fall collection in the MCZ.

Type locality. Of *atronitens* Siskiyou Co., California (lectotype here designated); of *reversa*, Lake Tahoe, San Bernardino Mts., California (lectotype not designated).

Type depository. Of *atronitens* USNM (35240); of *reversa*, MCZ.

Distribution. Figure 13. Colorado and Arizona to Oregon and California.

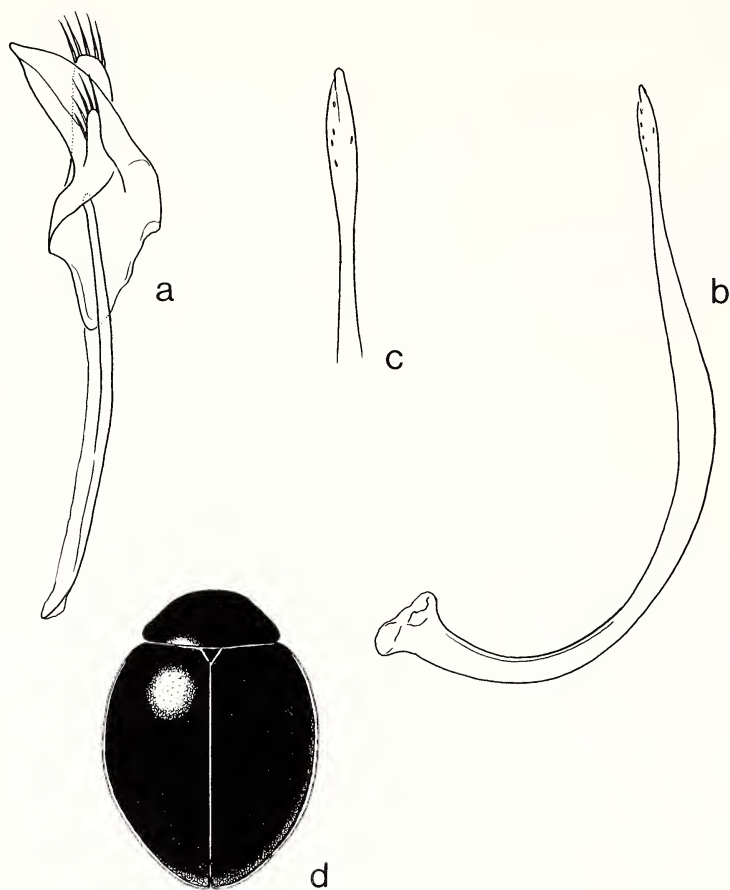


Fig. 14. *Coccidophilus marginata*.

Coccidophilus marginata (LeConte)

Fig. 14a-d; Map, Fig. 13

Pentilia marginata LeConte, 1878a, p. 400—Korschevsky, 1931, p. 224.

Smilia marginata: Horn, 1895, p. 82—Casey, 1899, p. 135.

Epismilia marginata: Cockerell, 1903, p. 38.

Microweisea marginata: Cockerell, 1903, p. 38—Leng, 1920, p. 213—Wingo, 1952, p. 27—Belicek, 1976, p. 297.

Cryptoweisea marginata: Gordon, 1970d, p. 215.

Coccidophilus marginata: Gordon, 1977, p. 203.

Diagnosis. Length 1.20 to 1.25 mm, width 0.70 to 1.00 mm. Form elongate (Fig. 14d). Color light brown; epipleuron yellowish brown. Male genitalia as in Figure 14a-b.

Discussion. The 2 interocular depressions on the frons are usually pronounced in

this species, feeble or absent in *C. atronitens*; and *C. marginata* is much more coarsely punctured dorsally than *C. atronitens* (see remarks under *C. atronitens*). LeConte apparently had one type specimen which must be considered the holotype. This male in his collection is labeled "Marquette, Mich., 29-6/Type 6701(red paper)/Pentilia marginata LeC."

Type locality. Marquette, Michigan.

Type depository. MCZ.

Distribution. Figure 13. MAINE: Mt. Katahdin. MICHIGAN: Marquette. NEW JERSEY: Angelsea; Burlington Co. NEW YORK: Ithaca; Mt. Whiteface. PENNSYLVANIA: Blair Co., Duncansville; Indiana Co., Shelocta; Philadelphia.

Genus *Gnathoweisea* Gordon

Gnathoweisea Gordon, 1970a, p. 47—Gordon, 1977, p. 204. Type-species; *Smilia planiceps* Casey, by original designation.

Microweisini with form elongate, oval, pronotum partially covering head; dorsum nearly glabrous, short, sparse pubescence present. Head elongate anterior to antennal insertion, lateral border margined (Fig. 15a); eyes separated by 6 times the width of an eye, very coarsely faceted. Apical segment of maxillary palpus elongate, slender, conical. Antenna with 6-segmented scape, 3-segmented club (Fig. 15b). Prosternum with or without anterior lobe. Postcoxal line as in Figure 15d. Tarsus trimerous. Male genitalia asymmetrical, paramere somewhat reduced.

Two species have previously been placed in this genus, and four species are described here. The extremely elongate head is the most obvious characteristic of *Gnathoweisea*, but the 9-segmented antenna with a small, compact club is equally distinctive within this tribe. The head is deeply inserted within the prothorax, the intercoxal process is lobed anteriorly and protrudes ventrally except in *G. schwarzi*. No host data is available, but members of this genus are undoubtedly scale predators, probably on diaspine scales. The species of *Gnathoweisea* were reviewed by Gordon (1970a), and the genus was discussed again by Gordon (1977).

KEY TO SPECIES OF *GNATHOWEISEA*

1. Pronotum without oblique line across anterolateral angle; prosternum not lobed anteriorly; anterior border of mesosternum raised (Fig. 15c) *schwarzi* Gordon
- Pronotum with oblique line across anterolateral angle; prosternum lobed anteriorly; anterior border of mesosternum flat 2
- 2(1). Length 1.20 mm or more *hageni*, n. sp.
- Length 1.10 mm or less 3
- 3(2). Head extremely elongate, abruptly narrowed between hind margin of eye and antennal insertion; Nevada *ferox*, n. sp.
- Head shorter, not abruptly narrowed; not known from Nevada 4
- 4(3). Dorsal color light brown; elytral punctures fine, lightly impressed; pronotal surface feebly alutaceous *micula*, n. sp.
- Dorsal color brown to black; elytral punctures coarse, distinctly impressed; pronotal surface strongly alutaceous 5
- 5(4). Elytral punctures separated by a diameter or less; Arizona, California *planiceps* (Casey)
- Elytral punctures separated by more than a diameter; Texas *texana*, n. sp.

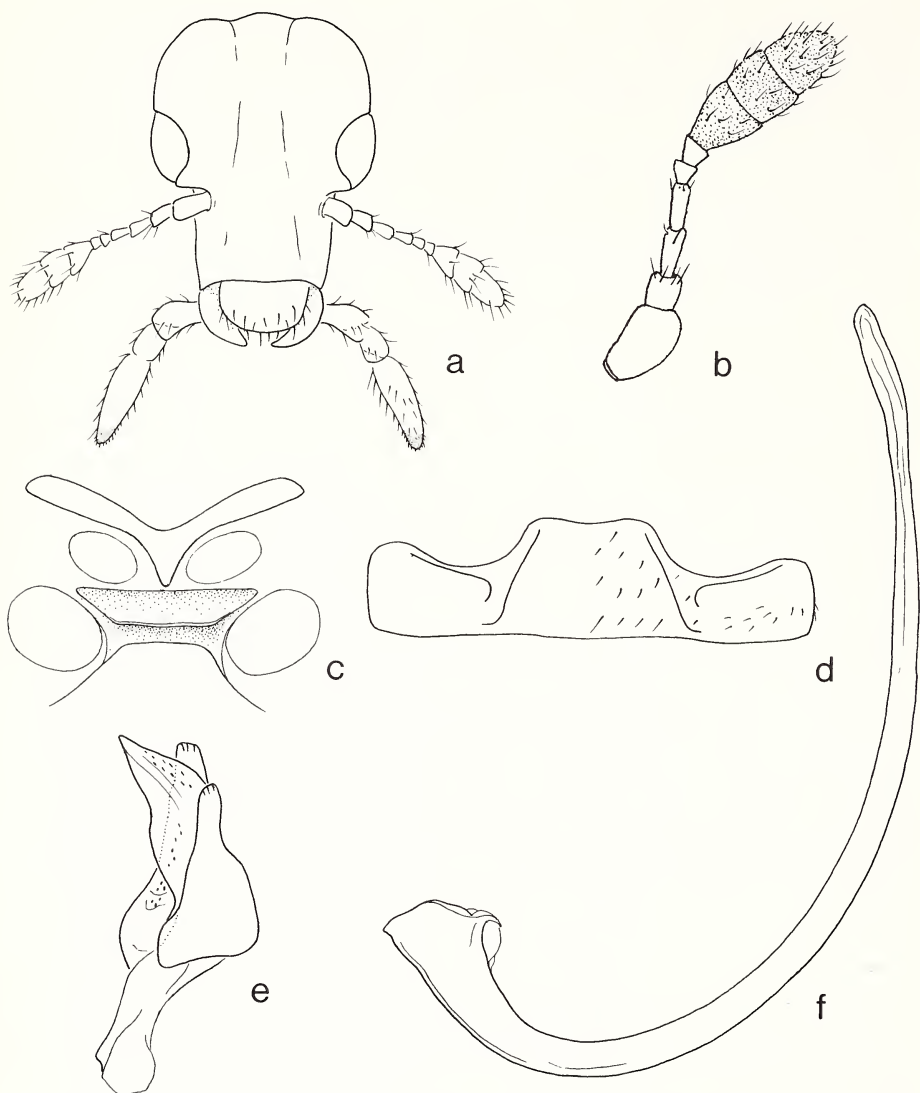


Fig. 15. *Gnathowisea* sp. a. Head. b. Antenna. c. Metasternum. d. Postcoxal line. e, f. *Gnathowisea schwarzi*.

Gnathowisea schwarzi Gordon

Fig. 15c, e, f; Map, Fig. 17

Gnathowisea schwarzi Gordon, 1970a, p. 50.

Diagnosis. Length 0.98 to 1.03 mm, width 0.70 to 0.75 mm. Color medium brown except pronotum often dark brown or piceous. Male genitalia as in Figure 15e, f.

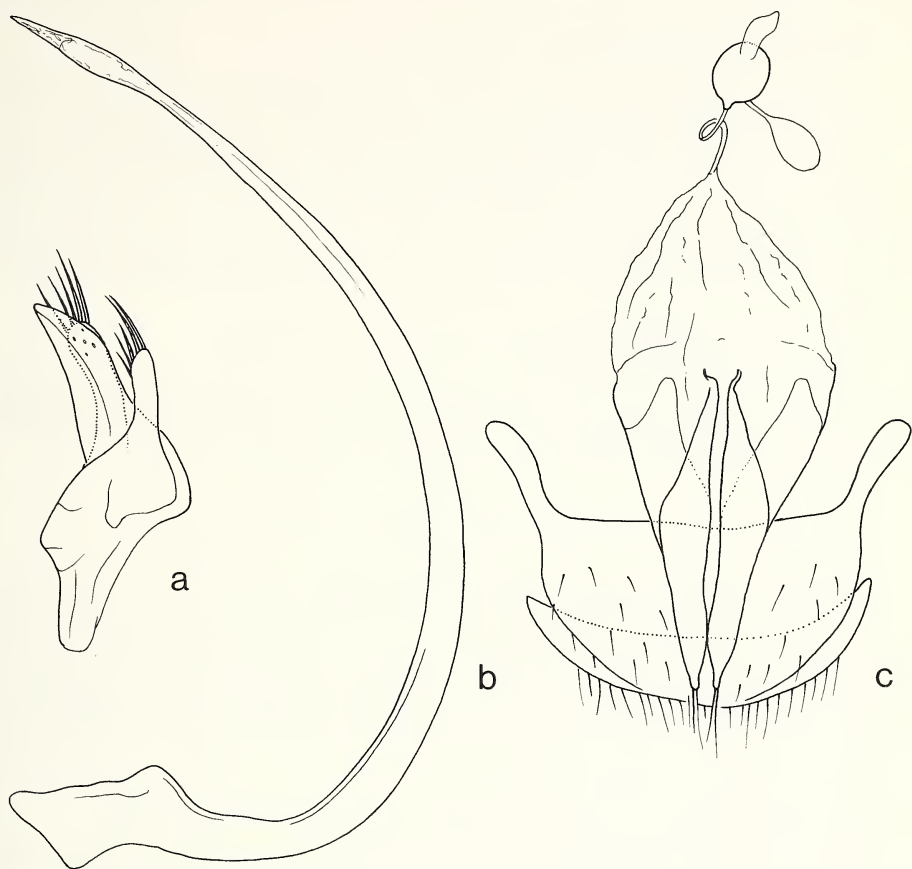


Fig. 16. *Gnathowisea planiceps*.

Discussion. This species differs from the other members of the genus in having the prosternum not at all lobed in front and the apex of the mesosternum raised to form a ventrally directed ridge (Fig. 15c). The intercoxal process of the prosternum is also much narrower than in the other 2 species.

Type locality. Williams, Arizona.

Type depository. USNM (70406).

Distribution. Figure 17. ARIZONA: type locality.

Gnathowisea planiceps (Casey)

Fig. 16a-c; Map, Fig. 17

Smilia planiceps Casey, 1899, p. 135.

Microwisea planiceps: Cockerell, 1903, p. 38—Leng, 1920, p. 213.

Pentilia planiceps: Korschevsky, 1932, p. 225.

Gnathowisea planiceps: Gordon, 1970a, p. 50.

Diagnosis. Length 0.85 to 1.10 mm, width 0.72 to 0.78 mm. Color dark brown or piceous. Male genitalia as in Figure 16a, b. Female genitalia as in Figure 16c.

Discussion. This species was previously known only from California, but I have seen several specimens from Arizona that are apparently *G. planiceps*. For comparative remarks see the discussion under *G. ferox*, n. sp. There are 2 type specimens of *S. planiceps* in the Casey collection. The first of these, a male, is here designated and labeled the lectotype; the other specimen is designated and labeled a paralectotype.

Type locality. Southern California (lectotype here designated).

Type depository. USNM (35242).

Distribution. Figure 17. ARIZONA: Bright Angel Camp; Huachucha Mts., Millers Canyon; Hot Springs; Pima Co., Santa Rita Exp. Range; Santa Rita Mts.; Madera Canyon. CALIFORNIA: Argus Mts.; Pomona; Riverside Co., Sage.

***Gnathowisea texana*, new species**

Map, Fig. 17

Description. Female, length 1.0 mm, width 0.72 mm. Form elongate, oval. Color dark brown, head and pronotum nearly black. Head alutaceous, feebly shiny, nearly impunctate; moderately prolonged anterior to eye, sides parallel. Pronotum dull, alutaceous, meshes small, punctures fine, indistinct, separated by one to 3 times a diameter. Elytron shiny, punctures coarse, separated by slightly more than a diameter. Ventral surface smooth medially, lateral portion of metasternum and entire abdomen alutaceous.

Holotype. Female. TEXAS: Bell Co., Co. Rd., 4 mi. E. Heidenheimer, Barton Weems Farm, 26 Jun. 1978, coll. Robbins & Critchfield. USNM(101326).

This species closely resembles *G. planiceps*, but the elytral punctures are less dense in *planiceps*. The only specimen examined is a female, therefore no genitalic comparisons are possible. The specific name refers to the state in which the holotype was collected.

***Gnathowisea micula*, new species**

Map, Fig. 17

Description. Female, length 1.05 mm, width 0.80 mm. Form elongate, oval. Color light brown; head, pronotum, and ventral surface slightly darker brown. Head shiny, feebly alutaceous, impunctate; short anterior to eye and slightly widened. Pronotum feebly alutaceous, somewhat shiny, punctures fine, indistinct, separated by less than to twice a diameter. Elytron shiny, punctures feebly impressed, separated by one to 3 times a diameter. Ventral surface smooth medially, lateral portion of metasternum and entire abdomen alutaceous.

Holotype. Female. NEW MEXICO: Deming, July 11–12, 4,300–4,400 ft., Wickham. USNM (101327).

Paratypes. Total 2 (females) (Fig. 17). ARIZONA: Adamana, 7-V-03, HS Barber collector; Walnut, Wickham. (USNM).

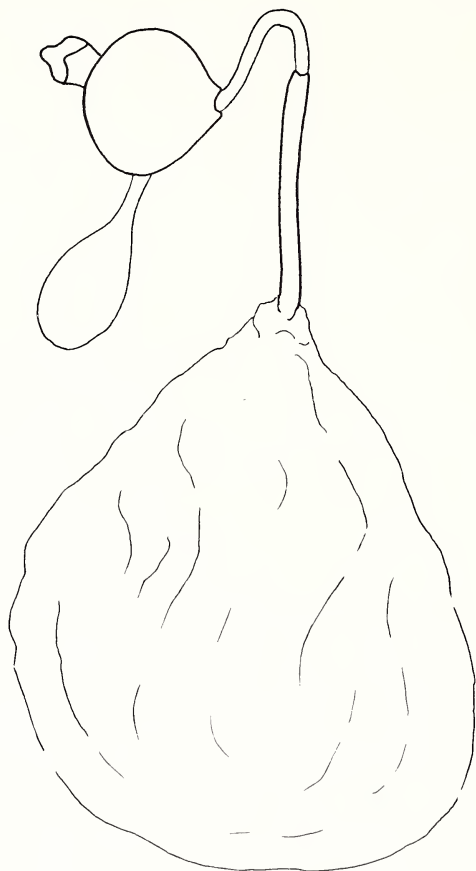


Fig. 18. *Gnathowisea hageni*.

amined. The specific epithet is from the Latin *mica*, meaning crumb, or morsel, and refers to the small size.

***Gnathowisea hageni*, new species**

Fig. 18; Map, Fig. 17

Description. Female, length 1.50 mm, width, 1.0 mm. Form elongate, oval. Color brown; head and pronotum dark brown. Head alutaceous, slightly shiny, punctures fine, separated by 2 to 3 times a diameter; short anterior to eye and strongly widened. Pronotum feebly alutaceous, shiny, punctures distinct, separated by one to 3 times a diameter. Elytron shiny, punctures coarse, separated by 2 to 4 times a diameter. Ventral surface smooth medially, lateral portion of metasternum and entire abdomen alutaceous. Genitalia as in Figure 18.

Variation. Length 1.25 to 1.50 mm, width 0.90 to 1.0 mm.

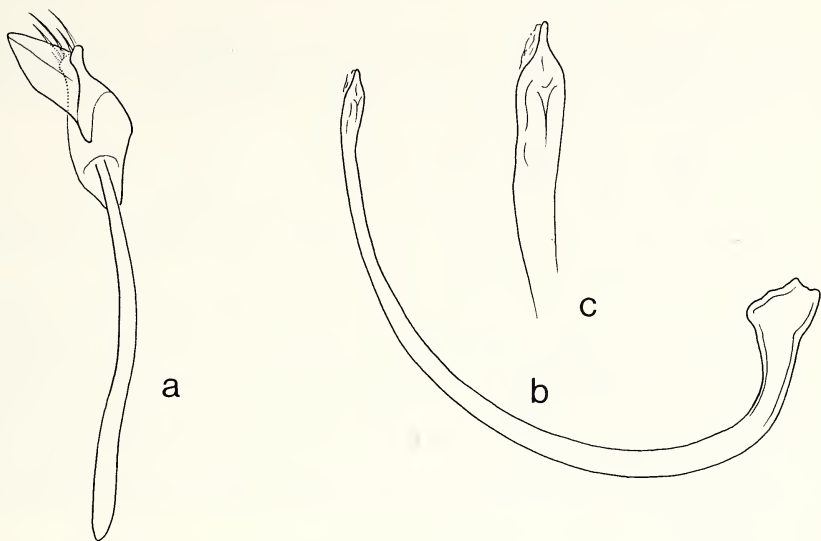


Fig. 19. *Gnathoweisea ferox*.

Holotype. Female. CALIFORNIA: Yuba Co., Bullards Bar, II-1956, K. S. Hagen Collector. USNM (101328).

Paratypes. Total 2 (females) (Fig. 17). CALIFORNIA: same data as holotype (KSH).

This is the largest species of *Gnathoweisea* known. The head is short as in *G. micula*, and the pronotal punctures are distinctly visible. All specimens examined are females. The species is named for Kenneth Hagen, the collector, and one who has contributed much to the biosystematics of Coccinellidae.

***Gnathoweisea ferox*, new species**

Fig. 19a-c; Map, Fig. 17

Description. Male, length 1.0 mm, width 0.72 mm. Form elongate, oval. Color dark brown; head and pronotum black; leg piceous; epipleuron yellowish brown. Head dull, strongly alutaceous, nearly impunctate; extremely elongate, abruptly narrowed between hind margin of eye and antennal insertion. Pronotum dull, alutaceous, meshes very small, punctures very fine, indistinct, separated by one to 4 times a diameter. Elytron shiny, densely, coarsely punctured, punctures separated by a diameter or less. Ventral surface smooth medially, lateral portion of metasternum and entire abdomen alutaceous. Genitalia as in Figure 19a-c.

Holotype. Male. NEVADA: Churchill Co., 6 mi. east of Frenchman, 16-VI-1973, Stephen J. Chaplin. USNM(101329).

Paratypes. Total 9 (Fig. 17). Same data as holotype except 3 dated 22 Aug. 1972. (USNM).

Gnathowisea ferox appears to have the head more strongly tapered (narrowed from the hind margin of the eyes to the antennal insertion) than the other members of the genus. The specific epithet is from the Latin meaning fierce, and refers to the forbidding appearance of the head and mouthparts.

Genus *Nipus* Casey

Nipus Casey, 1899, p. 132—Leng, 1920, p. 213—Korschefsky, 1931, p. 175—Gordon, 1970f, p. 71—Gordon, 1977, p. 208. Type-species; *Nipus biplagiatus* Casey, by subsequent designation of Korschefsky, 1931.

Microweisini with form oval; dorsum glabrous or partially pubescent; pronotum usually completely concealing head (Fig. 20d). Head strongly elongate anterior to antennal insertion but not as elongate as in *Gnathowisea*; eyes separated by 3 times the width of an eye. Apical segment of maxillary palpus elongate, somewhat conical. Antenna with 7-segmented scape, 3-segmented club (Fig. 20a). Prosternum with anterior lobe pronounced, semicircular, nearly concealing mouthparts ventrally (Fig. 20b). Postcoxal line as in Figure 20c. Tarsus trimerous. Male genitalia asymmetrical, paramere reduced.

This genus contains 4 species occurring in the southwestern United States. *Nipus* is readily distinguished from other genera of Microweisini because the head is almost always completely concealed beneath the pronotum. The partially concealed head found in *Gnathowisea* is the only remotely similar condition known. The species of *Nipus* were reviewed by Gordon (1970f), and the genus was discussed again by Gordon (1977). The only host record for this genus is that of *N. biplagiatus* preying upon *Ehrhornia cupressi* (Ehrhorn), but all members of the genus are undoubtedly scale predators.

KEY TO SPECIES OF *Nipus*

- 1. Elytron with a pale red or yellow spot, or red or yellow band (Fig. 20d) 2
- Elytron without pale spot or band 3
- 2(1). Form elongate, parallel sided (Fig. 20d); California *biplagiatus* Casey
- Form elongate, oval, not parallel sided (Fig. 24); Arizona, Utah *occiduus* Gordon
- 3(1). Form narrow, elongate (Fig. 21); pronotum dull, strongly alutaceous; punctures on elytron extremely coarse; California *niger* Casey
- Form oval (Fig. 23); pronotum shiny, feebly alutaceous; punctures on elytron fine; Arizona, Colorado *planatus* Gordon

Nipus biplagiatus Casey

Fig. 20d–f; Map, Fig. 22

Nipus biplagiatus Casey, 1899, p. 133—Leng, 1920, p. 213—Herbert, 1920, p. 18—Schilder, 1928, p. 237—Korschefsky, 1931, p. 175—Gordon, 1970f, p. 72.

Diagnosis. Length 1.25 to 1.50 mm, width 0.75 to 0.82 mm. Form elongate, parallel-sided, abruptly narrowed posteriorly (Fig. 20d). Color piceous; large median area of elytron and anterior margin of pronotum yellow, ventral surface yellowish brown. Male genitalia as in Figure 20e, f.

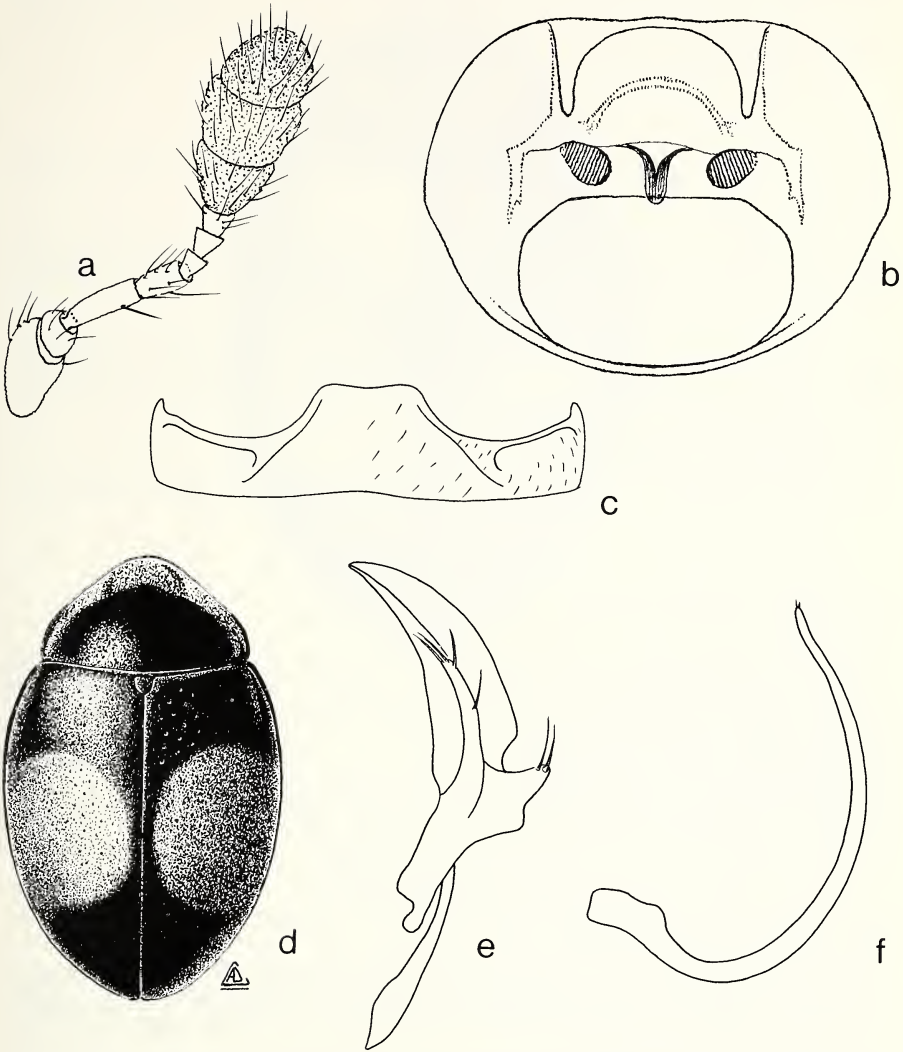


Fig. 20. *Nipus biplagiatus*. a. Antenna. b. Prosternum. c. Postcoxal line. d. Habitus; e, f. male genitalia.

Discussion. This species is known only from California and resembles *N. occiduus* which apparently does not occur in California. In addition to the key characters, *N. occiduus* is smaller and not as coarsely punctured as *N. biplagiatus*. In the Casey collection is a unique female which must be considered the holotype of *N. biplagiatus*.
Type locality. Los Angeles, California.
Type depository. USNM (35224).

Distribution. Figure 22. CALIFORNIA: Contra Costa Co., Vine Hill; Los Angeles; Los Gatos; Orange Co., Costa Mesa; San Bernardino; Upland.

Nipus niger Casey
Fig. 21; Map, Fig. 22

Nipus niger Casey, 1899, p. 133—Leng, 1920, p. 213—Korschefsky, 1931, p. 176—Gordon, 1970f, p. 73.

Diagnosis. Length 1.05 to 1.10 mm, width 0.70 to 0.74 mm. Form elongate, oval, gradually narrowed posteriorly (Fig. 21). Color brownish piceous; anterior margin of pronotum yellowish brown, ventral surface brown.

Discussion. No males of this species were available for study. *Nipus niger* is most similar to *N. planatus*, but the key characters will readily separate the 2 species. A unique female in the Casey collection must be considered the holotype of *N. niger*.

Type locality. Sonoma Co., California.

Type depository. USNM (35225).

Distribution. Figure 22. CALIFORNIA: Humboldt Co.; Los Gatos; Sonoma Co.

Nipus planatus Gordon
Fig. 23; Map, Fig. 22

Nipus planatus Gordon, 1970f, p. 74.

Diagnosis. Length 1.19 to 1.24 mm, width 0.81 to 0.84 mm. Form elongate, oval, evenly narrowed anteriorly and posteriorly (Fig. 23). Color brown; anterior and lateral borders of pronotum yellowish brown, mouthparts and leg yellowish brown.

Type locality. Salida, Colorado.

Type depository. USNM (70851).

Distribution. Figure 22. ARIZONA: Bright Angel Camp. COLORADO: Salida.

Nipus occiduus Gordon
Fig. 24; Map, Fig. 22

Nipus occiduus Gordon, 1970f, p. 75.

Diagnosis. Length 1.20 to 1.24 mm, width 0.75 to 0.78 mm. Form oval (Fig. 24). Color piceous; elytron with yellow spot occupying $\frac{1}{2}$ to $\frac{2}{3}$ of elytron, anterior margin of pronotum yellowish brown.

Discussion. See comparative remarks under *N. biplagiatus*.

Type locality. Wasatch, Utah.

Type depository. USNM (70852).

Distribution. Figure 22. ARIZONA: Chiricahua Mts.; Huachuca Mts., Millers Canyon; Oracle; Santa Rita Mts; Williams. UTAH: Wasatch.

Tribe Serangiini

Serangiini Blackwelder, 1945, p. 450—Pope, 1962, p. 627—Sasaji, 1967, p. 2—Sasaji, 1968, p. 20—Gordon, 1970e, p. 356—J. Chapin, 1974, p. 13—Belicek, 1976, p. 292—Gordon, 1977, p. 208.

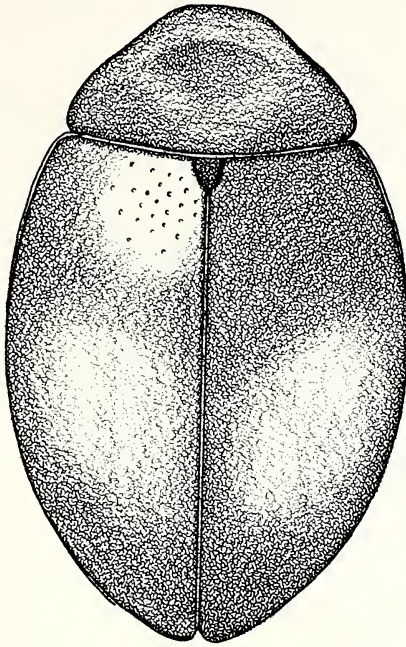


Fig. 21. *Nipus niger*.

Sticholotidinae with form compact; dorsally pubescent or not. Head slightly prolonged anterior to antennal insertion, emarginate around insertion; eye coarsely faceted (Fig. 25a). Apical segment of maxillary palpus either elongate and conical, or short and barrel shaped. Antenna 8 or 9-segmented, club composed of a single segment (Fig. 25b). Prosternum strongly lobed anteriorly, concealing mouthparts (Fig. 25a), notched on each side for reception of antenna. Epipleuron with fovea for reception of leg. Leg received in deep cavity on ventral surface; at least front femur broad, flat, concealing tibia when leg retracted; at least front tibia angulate externally. Tarsus cryptotetramerous or trimerous. Abdomen with 5 visible sterna. Postcoxal line on first abdominal sternum complete (Fig. 25c). Male genitalia asymmetrical, paramere reduced. Female genitalia lacking infundibulum.

This tribe presently contains 6 genera, 5 of which are native to the Old World. *Delphastus* is the only native American representative of the tribe with 12 species occurring from Canada to Argentina. *Catana clauseni* Chapin occurs in Cuba, but was introduced from Indonesia in 1930 for biocontrol of the citrus blackfly, *Aleurocanthus woglumi* Ashby. Serangiini is a closely knit group of genera, highly distinctive in appearance. The strongly lobed prosternum that conceals the mouthparts and has a notch on each side for reception of the antenna is the most striking characteristic; in addition, the ventral surface is deeply foveate for reception of the legs, and at least the anterior leg is broad, flattened. See Gordon (1977) for further discussion of the genera occurring in the Western Hemisphere.

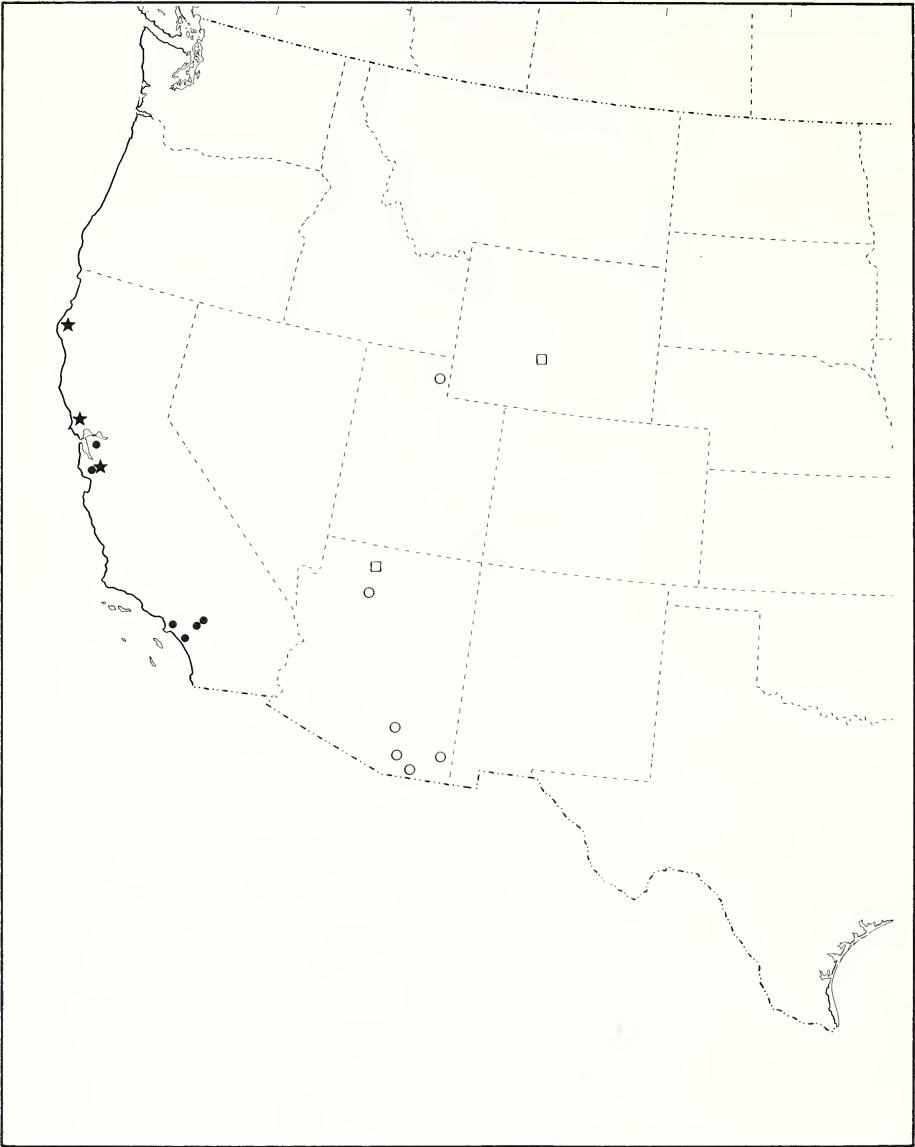


Fig. 22. Distribution. *Nipus biplagiatus* (dot); *N. niger* (star); *N. planatus* (square); *N. occidentius* (open circle).

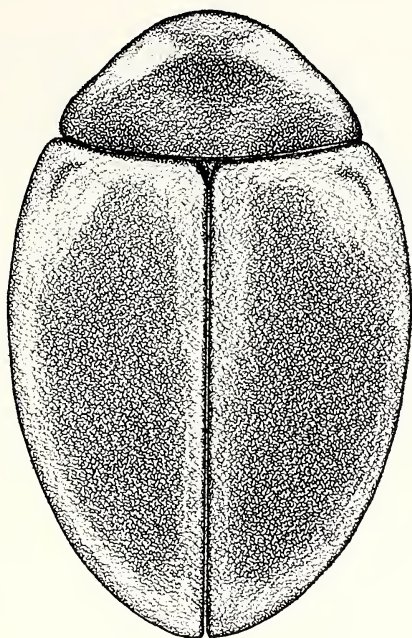


Fig. 23. *Nipus planatus*.

Genus *Delphastus* Casey

Delphastus Casey, 1899, p. 111—Leng, 1920, p. 214—Korschefskey, 1931, p. 220—Chapin, 1940, p. 264—Wingo, 1952, p. 22—J. Chapin, 1974, p. 13—Belicek, 1976, p. 292—Gordon, 1970e, p. 357—Gordon, 1977, p. 209. Type-species; *Oeneis pusillus* LeConte, by subsequent designation of Korschefskey, 1931.

Serangiini with form hemispherical, slightly elongate. Head with apical segment of maxillary palpus slender, somewhat conical. Antenna 9-segmented (Fig. 25b). Elytron without sutural line. Epipleuron not descending externally. Leg with femur broad; tibia angulate externally. Tarsus trimerous.

There are only 3 species of this genus described from the area north of Mexico; the remaining 9 described species occur from Mexico and the West Indies to Argentina. Members of *Delphastus* are known as predators on whiteflies (Aleyrodidae) with available host records as follows: *Aleurocanthus woglumi* Ashby; *Pelidius kelloggi* (Bemis); *Trialeurodes floridensis* (Quaintance); *Dialeurodes citri* (Ashmead); and *Dialeurodes citrifolii* (Morgan). However, a series of a species of *Delphastus* in the USNM collection bears the host data "on *Asterolecanium milaris* (Boisduval)", a pit scale. Kamiya (1966) records *Serangium japonicum japonicum* Chapin as feeding on the soft scales *Ceroplastes rubens* Maskell and *Ceroplastes japonicus* Green in Japan. It appears that members of the Serangiini feed on both whiteflies and scale insects. The species of *Delphastus* were taxonomically treated by Gordon (1970e).

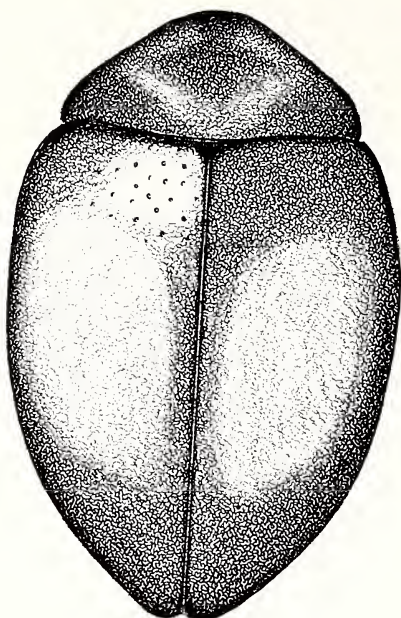


Fig. 24. *Nipus occiduus*.

KEY TO SPECIES OF *Delphastus*

1. Length less than 1.10 mm; color pale reddish yellow; Florida *pallidus* (LeConte)
- Length more than 1.30 mm; color light reddish brown to black; not restricted to Florida 2
- 2(1). Prosternal lobe densely, coarsely punctate; California *catalinae* (Horn)
- Prosternal lobe smooth; not restricted to California *pusillus* (LeConte)

Delphastus pallidus (LeConte)

Fig. 25e, g; Map, Fig. 27

Oeneis pallidus LeConte, 1878a, p. 400.

Cryptognatha pallida: Horn, 1895, p. 83.

Delphastus pallidus: Casey, 1899, p. 112—Leng, 1920, p. 214—Blatchley, 1924, p. 167—Korschefsky, 1931, p. 220—Gordon, 1970c, p. 360.

Diagnosis. Length 0.90 to 1.05 mm, width 0.70 to 0.80 mm. Color pale reddish yellow except leg yellow. Male genitalia as in Figure 25e, g.

Discussion. This small, pale species is readily recognizable by the key characters. The type is a unique female in the LeConte collection labeled "Sand Pt, Fla, 18-2/979/Type 6696(red paper)/*Oeneis pallidus* LeC." which must be considered the holotype.

Type locality. Sand Point, Florida.

Type depository. MCZ.

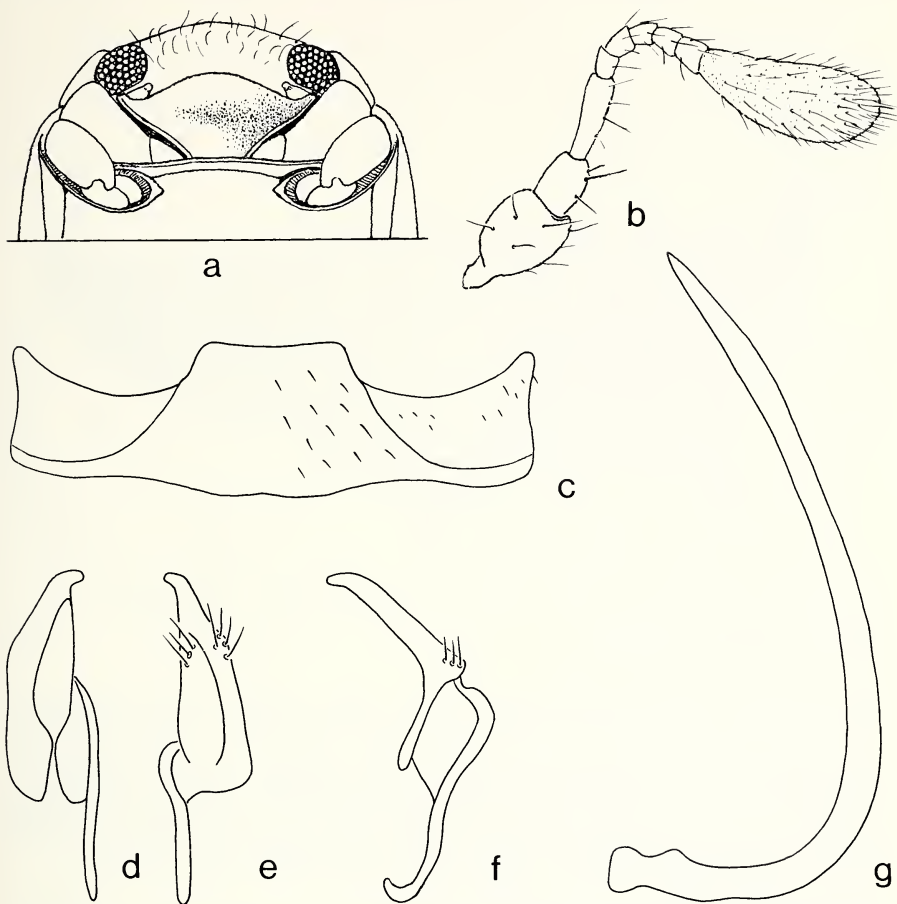


Fig. 25. *Delphastus pallidus*. a. Head and prosternum. b. Antenna. c. Postcoxal line. d-g. Male genitalia.

Distribution. Figure 27. FLORIDA: Homestead; Lake Alfred; Miami; Orlando; Pasco Co.; Sand Point; Volusia Co.

Delphastus catalinae (Horn)

Fig. 26a-d; Map, Fig. 27

Cryptognatha catalinae Horn, 1895, p. 83.

Delphastus catalinae: Casey, 1899, p. 112—Leng, 1920, p. 214—Korschefsky, 1931, p. 220—Gordon, 1970c, p. 365.

Diagnosis. Length 1.40 to 1.50 mm, width 1.10 to 1.18 mm. Color medium reddish brown, median area of pronotum slightly darker; legs and head of male pale yellowish brown. Male genitalia as in Figure 26a-d.

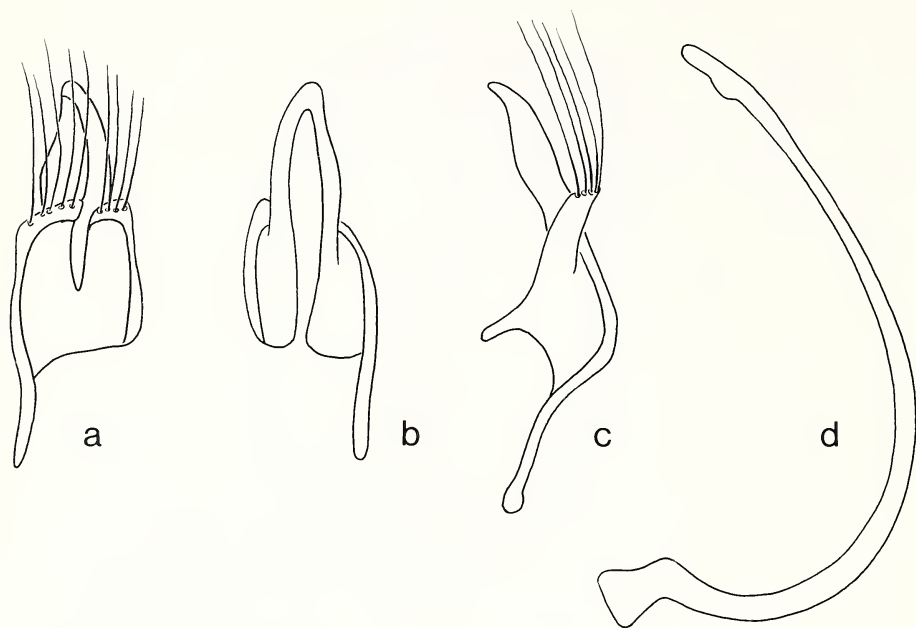


Fig. 26. *Delphastus catalinae*.

Discussion. The coarsely punctured prosternal lobe distinguishes this species from other North American *Delphastus*. In addition, *D. catalinae* is broader and usually paler in color than *D. pusillus* which it most closely resembles. The type is a unique female in the Horn collection labeled "Catalina Cal., 7-21-94/Holotype 3169(red paper)/*Cryptognatha catalinae* H." which must be considered the holotype.

Type locality. Catalina, southern California.

Type depository. MCZ.

Distribution. Figure 27. CALIFORNIA: Catalina; Los Angeles Co., Oak Canyon, Tanbark Flat; Pasadena, San Antonio Canyon; Santa Barbara.

Delphastus pusillus (LeConte)

Fig. 28a-c; Map, Fig. 27

Oeneis pusilla LeConte, 1852, p. 135—Crotch, 1873, p. 377.

Cryptognatha pusilla: Crotch, 1874b, p. 207—Horn, 1895, p. 83.

Delphastus pusillus: Casey, 1899, p. 112—Blatchley, 1910, p. 519—Leng, 1920, p. 214—Wingo, 1952, p. 45—J. Chapin, 1974, p. 14—Korschevsky, 1931, p. 220—Gordon, 1970e, p. 367.

Oeneis puncticollis LeConte, 1852, p. 135—Crotch, 1873, p. 377 (as female of *pusilla*).

Cryptognatha puncticollis: Crotch, 1874b, p. 207—Horn, 1895, p. 83.

Delphastus pusillus var. *puncticollis*: Casey, 1899, p. 112—Korschevsky, 1931, p. 220.

Delphastus puncticollis: Gordon, 1970e, p. 367.

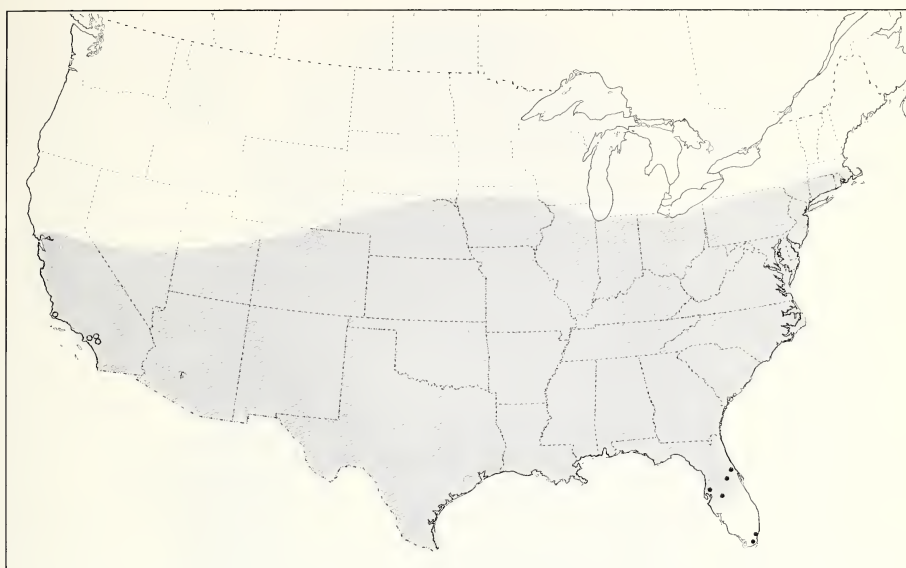


Fig. 27. Distribution. *Delphastus pallidus* (dot); *D. catalinae* (open circle); *D. pusillus* (shaded).

Delphastus sonoricus Casey, 1899, p. 112—Korschefsky, 1931, p. 221—Gordon, 1970e, p. 367.

Diagnosis. Length 1.40 to 1.60 mm, width 1.10 to 1.20 mm. Color black; prosternum and leg yellow, male with head and lateral margin of pronotum yellow. Male genitalia as in Figure 28a, b. Female genitalia as in Figure 28c.

Discussion. *Delphastus pusillus* is a widely distributed, variable species. The color pattern described above was taken from a Maryland specimen which agrees quite well with LeConte's original description. The southwestern U.S. specimens are usually dark brown rather than black and the males do not have lighter colored pronotal margins, it was to this form that Casey gave the name *D. sonoricus*. The brown form prevails south through Mexico and Central America with an occasional population from a coastal locality exhibiting the color pattern of typical *D. pusillus*. Its range appears to be continuous into South America at least as far as Peru.

I consider the three specimens of *D. pusillus* that remain in the LeConte collection type material. The first of these, a male labeled "(orange disc)/Type 6697(red paper)/Oe. pusilla LeC.", I designate and label the lectotype. The second, bearing only an orange disc, and the third bearing a pink disc are designated as paralectotypes. LeConte apparently had only one example of *O. puncticollis*, and this specimen in his collection labeled "(orange disc)/Type 6698/Oeneis puncticollis LeC." must be considered the holotype. Casey had 6 type specimens from southern Arizona and southern California. I designate and label a male as the lectotype and the remainder as paralectotypes.

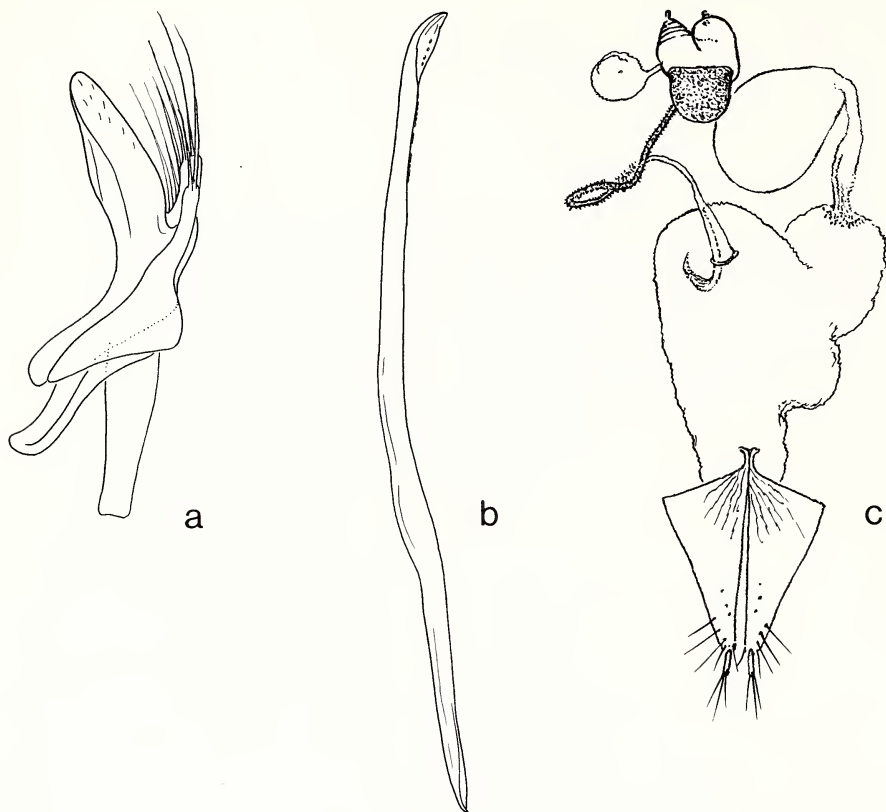


Fig. 28. *Delphastus pusillus*.

Type locality. Of *pusillus*, Georgia (lectotype here designated); of *puncticollis*, "Southern States"; of *sonoricus*, Tucson, Arizona (lectotype here designated).

Type depository. Of *pusillus* and *puncticollis*, MCZ; of *sonoricus*, USNM (35230).

Distribution. Figure 27. Massachusetts to Florida, west to California.

Cephaloscymnini, new tribe

Sticholotidinae of small size, length less than 3.0 mm. Head prominent, exposed, deflected ventrally; eye large, narrow, elongate, very finely faceted, inner margin parallel or closer at posterior border of eye than at anterior border; apex of clypeus truncate or subtruncate; gena with or without narrow extension onto eye. Antenna inserted frontally at apex of eye, insertion exposed or not; antenna short, 8–10-segmented, club 3-segmented. Apical segment of maxillary palpus long, slender, conical or parallel sided. Mandible bidentate apically, or unidentate with feeble, subapical tooth. Pronotum short, deeply excavated for reception of head, lateral border explanate, anterolateral angle strongly produced forward, extending nearly to apex

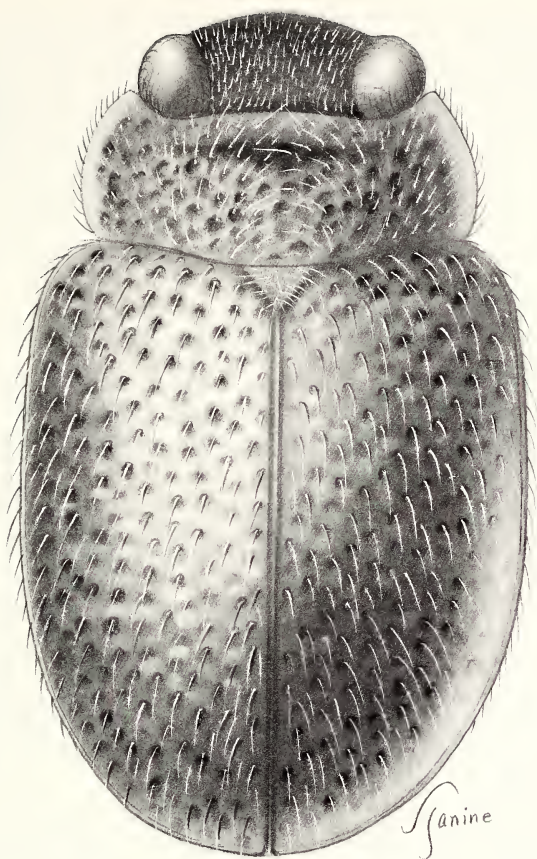


Fig. 29. *Cephaloscymnus zimmermani zimmermani*.

of eye. Prosternum broad, bicarinate or not, produced anteriorly to partially conceal mouthparts or not. Epipleuron broad or narrow, not foveate for reception of leg. Leg slender, simple. Tarsus cryptotetramerous; tarsal claw without tooth. Abdomen with 5 visible sterna. Postcoxal line on 1st abdominal sternum complete (Fig. 30g). Male genitalia symmetrical.

The group of genera here assigned to this tribe contain some of the most unusual appearing Coccinellidae in the entire family. These genera have previously been placed in the Scymninae, but examination of all morphological characters shows that they belong in the subfamily Sticholotidinae. They are not closely related to members of any presently established tribe; therefore, the establishment of the tribe Cephaloscymnini is deemed necessary. The included genera are *Cephaloscymnus* Crotch, *Prodilis* Mulsant, *Neaporia* Gorham, *Aneaporia* Casey and *Prodioloides* Weise. The genus *Cephaloscymnus* has been placed in the Scymnini or Ortaliini by authors, while

Prodilis, *Neaporia*, and *Prodiloides* have been placed in the Ortaliini. Casey considered *Aneaporia* to belong to the Exoplectrini but this was an obviously incorrect placement. All of these genera quite apparently share a common ancestry and must be grouped together as done here. Examination of species of this group in existing collections indicates that additional genera will have to be erected when a complete study is completed. The combination of short antenna; large, ventrally directed head; large, narrow, finely faceted eyes; and short, explanate pronotum readily separate this tribe, not only from other tribes of Sticholotidinae, but from all other North American Coccinellidae. The only genus in this tribe occurring north of Mexico is *Cephaloscymnus*.

Genus *Cephaloscymnus* Crotch

Cephaloscymnus Crotch, 1873, p. 382—Horn, 1895, p. 81—Casey, 1899, p. 160—Blatchley, 1910, p. 524—Leng, 1920, p. 214—Korschefskey, 1931, p. 168—Wingo, 1952, p. 19—Gordon, 1970b, p. 66. Type-species; *Cephaloscymnus zimmermanni* Crotch, by monotypy.

Cephaloscymnini with form elongate, slender (Fig. 29). Head broad between eyes, frons 3 times the width of an eye; inner margin of eyes nearly parallel; apex of clypeus subtruncate; gena not extending onto eye (Fig. 30a). Antennal insertion exposed; antenna 9-segmented, club 3-segmented (Fig. 30b). Apical segment of maxillary palpus slender, parallel-sided (Fig. 30c). Mandible unidentate apically, with feeble, subapical tooth (Fig. 30d). Surface of head and pronotum deeply, densely punctured, punctures contiguous or nearly so. Prosternum short, not produced anteriorly, without carinae (Fig. 30e). Male metasternum with large, deep, pubescent pit (Fig. 30f). Postcoxal line as in Figure 30g. Female genitalia without infundibulum; spermethecal capsule simple, lacking cornu or ramus (Fig. 31f).

The presence of a metacoxal pit in males and the short intercoxal prosternal process lacking carinae or an anterior protuberance distinguish *Cephaloscymnus* from the other genera of *Cephaloscymnini*. There are presently 7 species in this genus (Gordon, 1970b, 1974d), 2 of which are known only from Mexico and 4 from Mexico and the United States. *Cephaloscymnus bruchi* Weise was described from Brazil; I have not seen this species but suspect that it belongs in *Prodilis*. No host data is available for members of this genus, but they are probably scale predators. *Cephaloscymnus* has been revised by Gordon (1970b), with a subsequent paper (Gordon, 1974d) on additional species from Mexico.

KEY TO SPECIES OF *Cephaloscymnus*

1. Length 2.15 mm or more; eastern United States, Texas, Arizona, New Mexico, and Mexico 2
- Length 2.15 mm or less; California, Arizona, Texas, Mexico 3
- 2(1). Pronotum and elytron piceous to black; eastern U.S. *zimmermanni zimmermanni* Crotch
- Pronotum usually reddish, elytron piceous to brown; southwestern U.S. and north-eastern Mexico *zimmermanni australis* Gordon
- 3(1). Ventral surface black (except legs and mouthparts) *laevis* Gordon
- Ventral surface piceous or brown 4

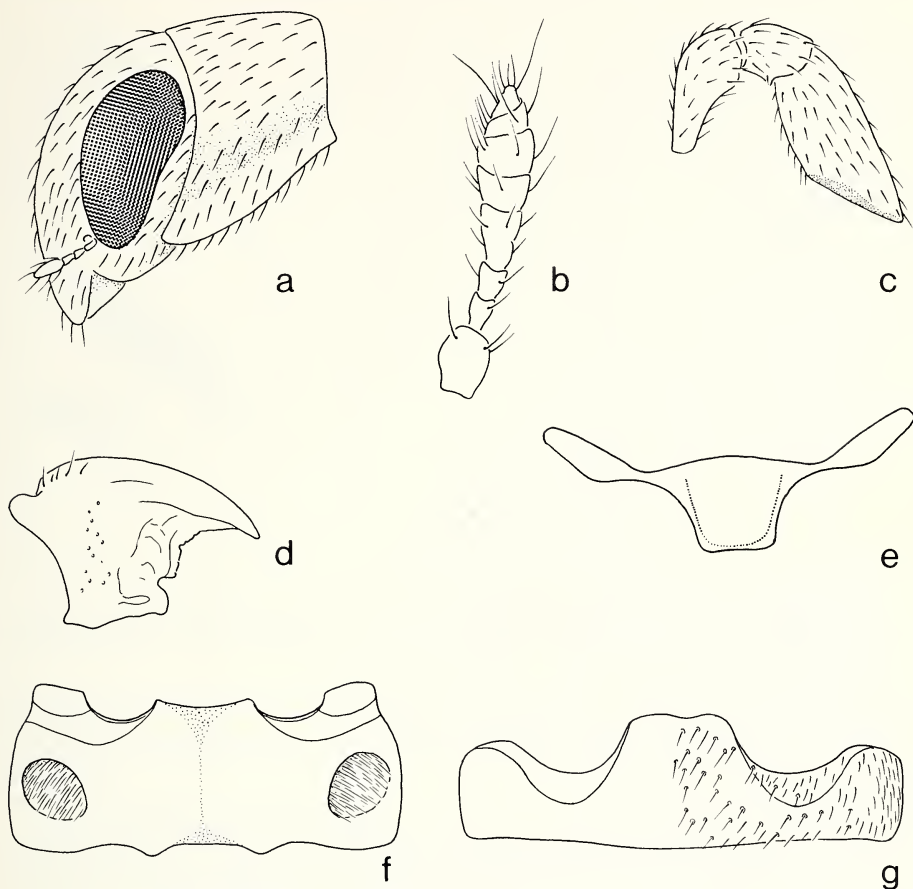


Fig. 30. *Cephaloscymnus* sp. a. Lateral view of head and pronotum. b. Antenna. c. Maxillary palpus. d. Mandible. e. Prosternum. f. Metasternum. g. Postcoxal line.

- 4(3). Pronotum finely punctured, anterior angle feebly explanate *occidentalis* Horn
 - Pronotum coarsely punctured, anterior angle strongly explanate *insulatus* Gordon

Cephaloscymnus zimmermanni zimmermanni Crotch

Figs. 29, 31a-e; Map, Fig. 32

Cephaloscymnus zimmermanni Crotch, 1873, p. 382—Horn, 1895, p. 11—Casey, 1899, p. 161—Blatchley, 1910, p. 531—Leng, 1920, p. 214—Korschefsky, 1931, p. 169—Wingo, 1952, p. 45.

Cephaloscymnus zimmermanni zimmermanni: Gordon, 1970b, p. 67—Gordon, 1974d, p. 45.

Diagnosis. Length 2.15 to 2.40 mm, width 1.30 to 1.45 mm. Form elongate (Fig.

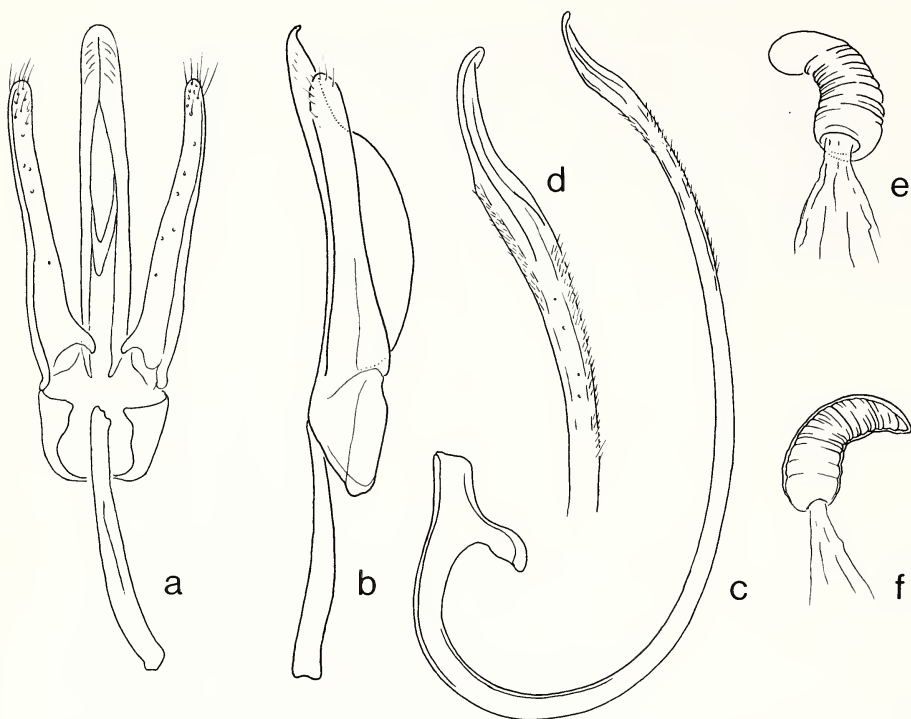


Fig. 31. a-c. *Cephaloscymnus zimmermanni zimmermanni*. f. *C. z. australis*.

29). Color piceous to black dorsally; ventral surface piceous, tarsus yellowish brown. Male genitalia as in Figure 31a-d. Female genitalia as in Figure 31e. Crotch had more than one type specimen, but only one female labeled "(yellow disc)/Type 8247/*Cephaloscymnus zimmermanni* Crotch" remains in the LeConte collection. I designate and label that female the lectotype.

Type locality. "Central Valley" (Ohio, Illinois, etc.) (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 32. DISTRICT OF COLUMBIA. INDIANA (state record). MARYLAND: Beltsville. NEW JERSEY: Montclair. SOUTH CAROLINA: (state record). TENNESSEE: Oak Ridge. VIRGINIA: Falls Church; Winchester. WEST VIRGINIA: Berkley.

Cephaloscymnus zimmermanni australis Gordon

Fig. 31f; Map, Fig. 32

Cephaloscymnus zimmermanni australis Gordon, 1970b, p. 67.

Diagnosis. Length 2.20 to 2.36 mm, width 1.38 to 1.60 mm. Color piceous to brown dorsally, pronotum red; venter black except leg, mouthparts and epipleuron

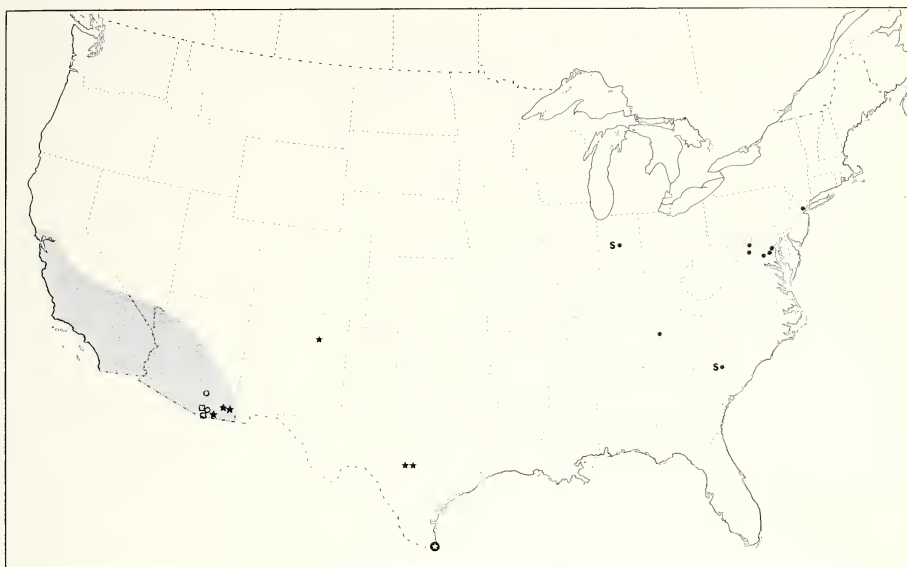


Fig. 32. Distribution. *Cephaloscymnus z. zimmermanni* (dot); *C. z. australis* (star); *C. occidentalis* (shaded, disjunct locality with circled star); *C. laevis* (open circle); *C. insulatus* (square).

yellowish brown. Male genitalia as illustrated for *zimmermanni zimmermanni*. Female spermathecal capsule as in Figure 31f. See Gordon (1974d) for detailed discussion.

Type locality. Kerrville, Texas.

Type depository. USNM (70399).

Distribution. Figure 32. ARIZONA: Chiricahua Mts.; Cochise Co., Palmerlee; Huachucha Mts., Millers Canyon. NEW MEXICO: Las Vegas. TEXAS: Kerrville; Mountain Home.

Cephaloscymnus occidentalis Horn

Fig. 33a–e; Map, Fig. 32

Cephaloscymnus occidentalis Horn, 1895, p. 111—Casey, 1899, p. 161—Leng, 1920, p. 214—Korschefsky, 1931, p. 169—Gordon, 1970b, p. 69—Gordon, 1974d, p. 46.

Diagnosis. Length 1.85 to 2.10 mm, width 1.10 to 1.40 mm. Color brown dorsally, pronotum reddish brown; venter piceous, leg brown. Male genitalia as in Figure 33a–c. Female genitalia as in Figure 33e.

Discussion. Horn apparently had more than one specimen when he described *C. occidentalis*, but only one specimen, a female labeled “425/Los Angeles Cal/Lectotype 3030/*C. occidentalis* Horn” remains in his collection, I designate and label this specimen the lectotype.

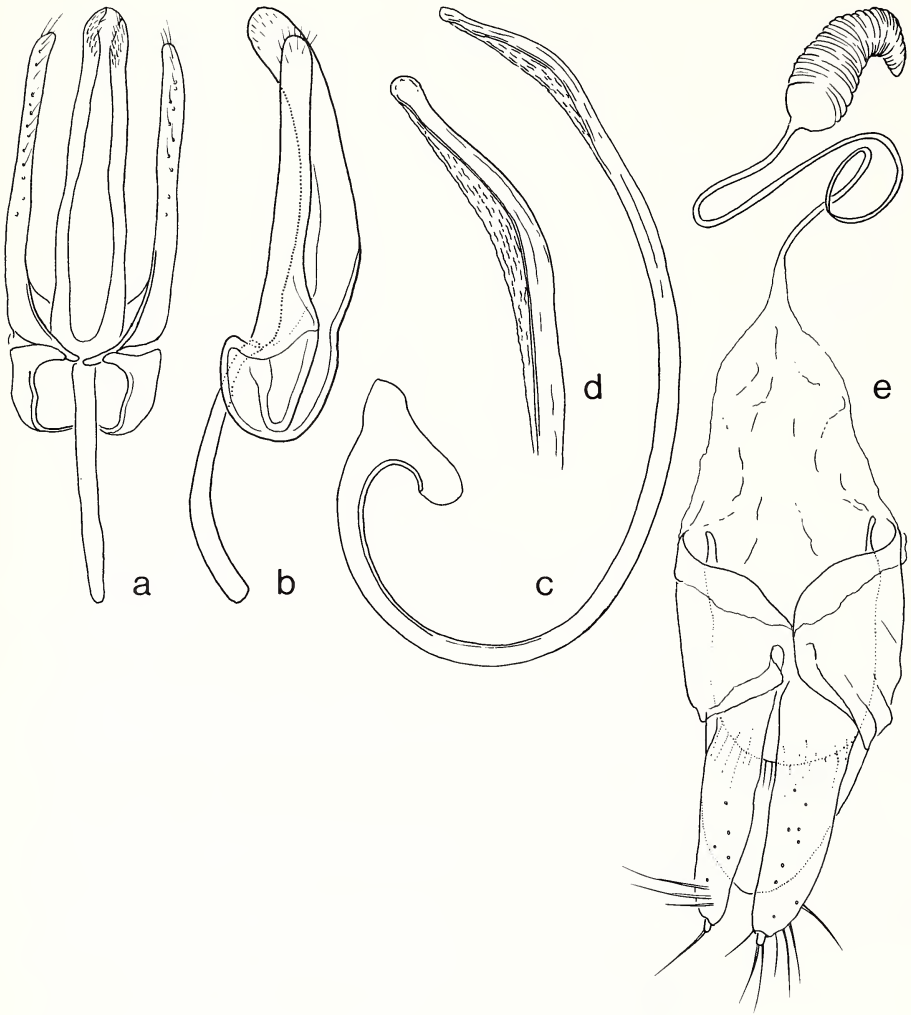


Fig. 33. *Cephaloscymnus occidentalis*.

Type locality. Los Angeles, California (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 32. Arizona to California, also Texas (Brownsville).

Cephaloscymnus insulatus Gordon

Fig. 34a-d; Map, Fig. 32

Cephaloscymnus insulatus Gordon, 1970b, p. 69.

Diagnosis. Length 2.00 to 2.10 mm, width 1.10 to 1.30 mm. Color brown dorsally,

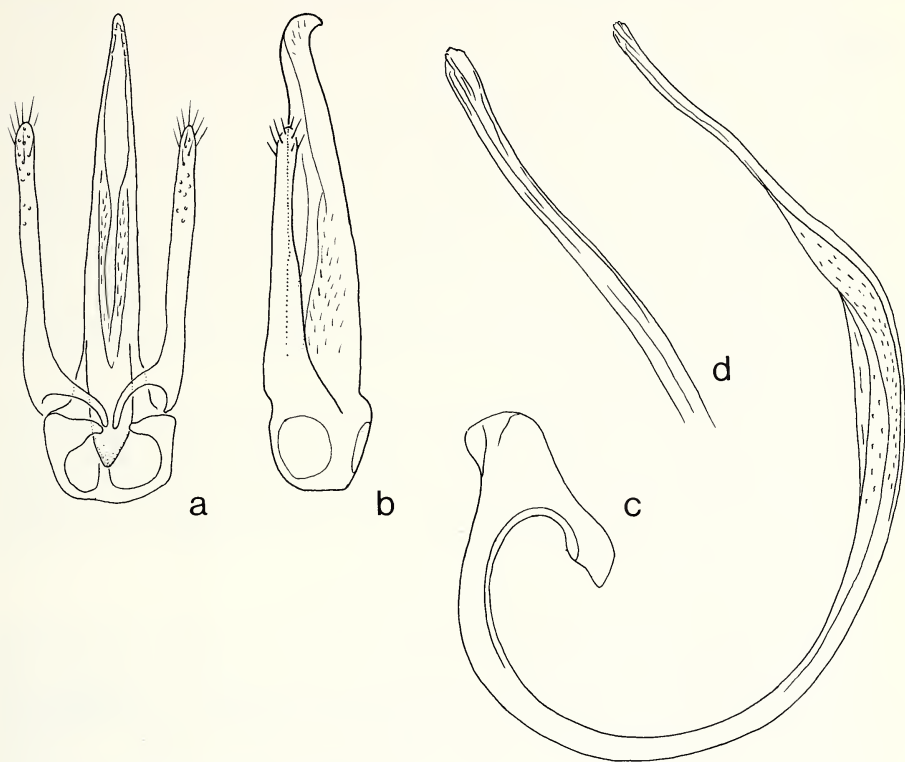


Fig. 34. *Cephaloscymnus insulatus*.

pronotum reddish; venter piceous, legs, mouthparts, and epipleuron brown. Male genitalia as in Figure 34a–d.

Type locality. Santa Rita Mts., Arizona.

Type depository. USNM (70400).

Distribution. Figure 32. ARIZONA: Oracle; Santa Rita Mts., Box Canyon.

Cephaloscymnus laevis Gordon

Fig. 35a–e; Map, Fig. 32

Cephaloscymnus laevis Gordon, 1970b, p. 70—Gordon, 1974d, p. 46.

Diagnosis. Length 2.00 mm, width 1.15 mm. Color light brown dorsally; venter black, mouthparts, leg, and epipleuron light brown. Male genitalia as in Figure 35a–d. Female genitalia as in Figure 35e.

Discussion. This species was originally described from a unique male from Nogales, Arizona. Gordon (1974d) recorded 2 specimens of *C. laevis* from Hidalgo, Mexico.

Type locality. Nogales, Santa Cruz Co., Arizona.

Type depository. CAS.

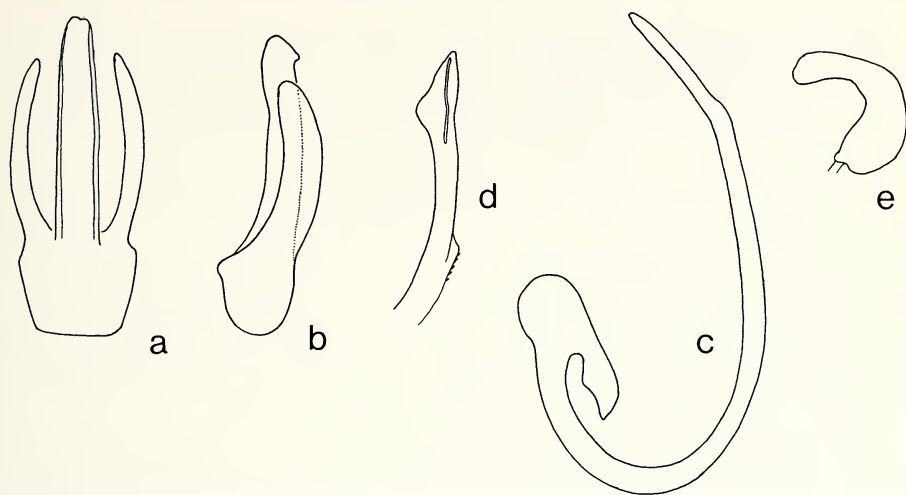


Fig. 35. *Cephaloscymnus laevis*.

anterolateral pronotal angle always pubescent. Head partially inserted in pronotum. Antenna short, compact, insertion exposed, 10-segmented, club symmetrical. Maxillary palpus with apical segment cylindrical or slightly securiform. Pronotum deeply emarginate anteriorly, lateral margin slightly explanate, anterolateral angle produced. Prosternum with intercoxal process broad, flat, without carinae. Leg free, simple; tarsus cryptotetramerous; tarsal claw with or without basal tooth. Abdomen with 5 visible sterna, sterna compact and tightly joined. Male genitalia symmetrical, form simple. Female genitalia with sperm duct short; genital plate elongate, triangular.

There are 2 North American genera in this tribe, *Zagloba* and *Zilus*. The tribe is strictly New World in distribution and forms a tightly knit group of genera and species. The 5-segmented abdomen, broad intercoxal process of the prosternum, and partially concealed head distinguish this tribe from other tribes in the Scymninae. Examination of species of *Zilus* and *Scymnillus* indicates that they are congeneric, therefore *Scymnillus* is placed as a junior synonym of *Zilus*, and the tribal name changed to *Zilini*.

KEY TO GENERA OF ZILINI

1. Elytron apparently glabrous *Zilus* Mulsant
- Elytron densely pubescent *Zagloba* Casey

Genus *Zilus* Mulsant

Scymnus (*Zilus*) Mulsant, 1850, p. 958—Korschefsky, 1931, p. 117. Type-species;

Scymnus (*Zilus*) *fulvipes* Mulsant, by monotypy.

Zilus: Blackwelder, 1945, p. 445.

Scymnillus Horn, 1895, p. 110—Casey, 1899, p. 114—Leng, 1920, p. 214—Kor-

schefsky, 1931, p. 171—Blackwelder, 1945, p. 445. J. Chapin, 1974, p. 47. Type-species; *Scymnillus aterrimus* Horn, by monotypy. **New Synonymy.**
Scymnillodes Sicard, 1922, p. 355—Korschefsky, 1931, p. 221—Chapin, 1930, p. 490—Blackwelder, 1945, p. 445 (as synonym of *Zilus*). Type-species; *Scymnillodes viridimicans* Sicard, by subsequent designation of Korschefsky, 1931.

Zilini with length less than 2.0 mm. Dorsal surface often with a metallic tint of varied colors; pubescence usually limited to head and pronotum with occasional sparse hairs present on elytron. Antenna extremely short, compact, club apparently 3-segmented (Fig. 36a). Apical segment of maxillary palpus slightly securiform (Fig. 36b). Gena extending onto eye. Tarsal claw with basal tooth (Fig. 36c). Postcoxal line extending downward from base of first abdominal sternum, joining apex of sternum nearly at lateral margin (Fig. 36d). Male genitalia simple, symmetrical. Female genitalia with infundibulum slender, elongate (Fig. 36e).

The key characters will separate *Zilus* from *Zagloba*. In addition, *Zilus* often has a metallic tint of green, violet, or blue, etc., on the dorsal surface, and the postcoxal line extends in an arc from the base of the sternum to the posterolateral angle. Most species of *Zilus* are neotropical with 4 species recorded from the United States. They are apparently predators on various scale insects such as *Lepidosaphes* spp. and *Aspidiotus* spp, but one species has been recorded on the whitefly *Aleurocanthus woglumi* Ashby. The genus has not been treated taxonomically as a whole.

KEY TO SPECIES OF *ZILUS*

1. Length 1.0 mm or less *eleutherae* (Casey), n. comb.
- Length 1.20 mm or more 2
- 2(1). Dorsal surface with purple or blue tint; form broad; known only from Florida ...
 *subtropicus* (Casey), n. comb.
- Dorsal surface black or brown; form somewhat elongate; not restricted to Florida 3
- 3(2). Dorsal surface reddish brown; western United States *aterrimus* (Horn), n. comb.
- Dorsal surface black; eastern United States *horni*, n. sp.

Zilus aterrimus (Horn), new combination

Fig. 37a–f; Map, Fig. 39

Scymnillus aterrimus Horn, 1895, p. 110—Casey, 1899, p. 115—Leng, 1920, p. 214—Korschefsky, 1931, p. 171—Hatch, 1961, p. 154.

Scymnillus cochisensis Nunenmacher, 1912, p. 451. **New Synonymy.**

Diagnosis. Length 1.25 to 1.60 mm, width 0.90 to 1.35 mm. Form elongate, oval (Fig. 37f). Color reddish brown except antenna, mouthparts and leg yellowish brown. Male genitalia as in Figure 37a–d. Female genitalia as in Figure 37e.

Discussion. I cannot separate *Z. cochisensis* (Nunenmacher) from *Z. aterrimus*; therefore, I place *Z. cochisensis* as a junior synonym of *Z. aterrimus*. Nunenmacher stated that he had 20 cotypes of *S. cochisensis*, 2 of which (male and female) are now in the California Academy of Science. I here designate and label the female as the lectotype and the male as a paralectotype. Horn had more than one specimen of *S. aterrimus*, and there are 3 specimens now in his collection, the first of these, a

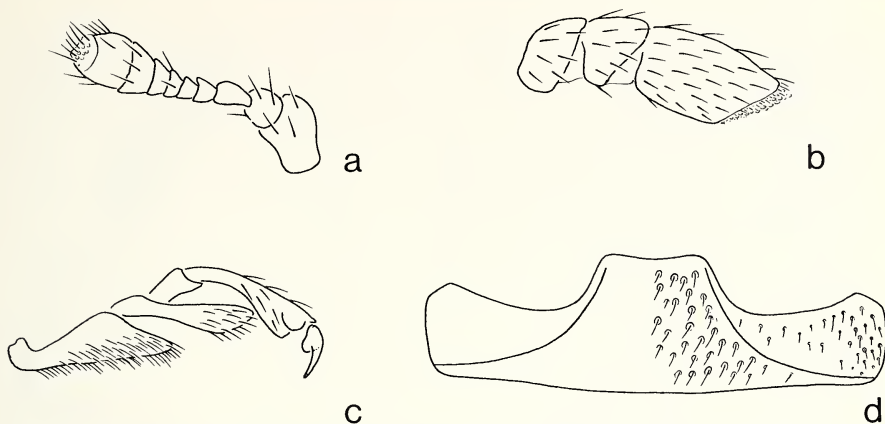


Fig. 36. *Zilus* sp. a. Maxillary palpus. b. Antenna. c. Tarsus. d. Postcoxal line.

female labeled "Oregon Koebele/40/Lectotype 3185/*Scymnillus aterrimus* Horn", I designate the lectotype, the remaining 2 are designated as paralectotypes.

Type locality. Of *aterrimus*, Oregon (lectotype here designated); of *cochisensis*, Benson, Cochise Co., Arizona (lectotype here designated).

Type depository. Of *aterrimus*, MCZ; of *cochisensis*, CAS.

Distribution. Figure 39. Idaho and Washington to California and Arizona.

***Zilus horni*, new species**

Fig. 38a-f; Map, Fig. 39

Scymnillus aterrimus: J. Chapin, 1974, p. 47 (not *S. aterrimus* Horn, 1895).

Description. Male, length 1.40 mm, width 1.0 mm. Form oval (Fig. 38f). Color black except mouthparts, antenna, and leg yellowish brown. Head coarsely punctured, punctures separated by less than a diameter. Pronotum with coarse punctures as on head laterally, separated by a diameter or less, discal area finely punctured, punctures separated by one to 2 times a diameter. Elytron finely punctured as on pronotal disc, punctures separated by one to 3 times a diameter. Ventral surface smooth, finely punctured medially, becoming dull with alutaceous sculpture and coarse punctures laterally. Genitalia as in Figure 36a-d.

Female, similar to holotype except length 1.50 mm, width 1.10 mm. Genitalia as in Figure 36e.

Variation. Length 1.40 to 1.60 mm.

Holotype. Male. MARYLAND: Piney Pt., Coll. Hubbard & Schwarz (USNM 101330).

Allotype. Female. MARYLAND: SI Java Farm Biol. Survey, 16:VII:1968, RE & Jan White Collectors. (USNM).

Paratypes. Total 23. MARYLAND: same data as holotype; same data as allotype; College Park, X-2-1960, P. J. Spangler. (USNM).

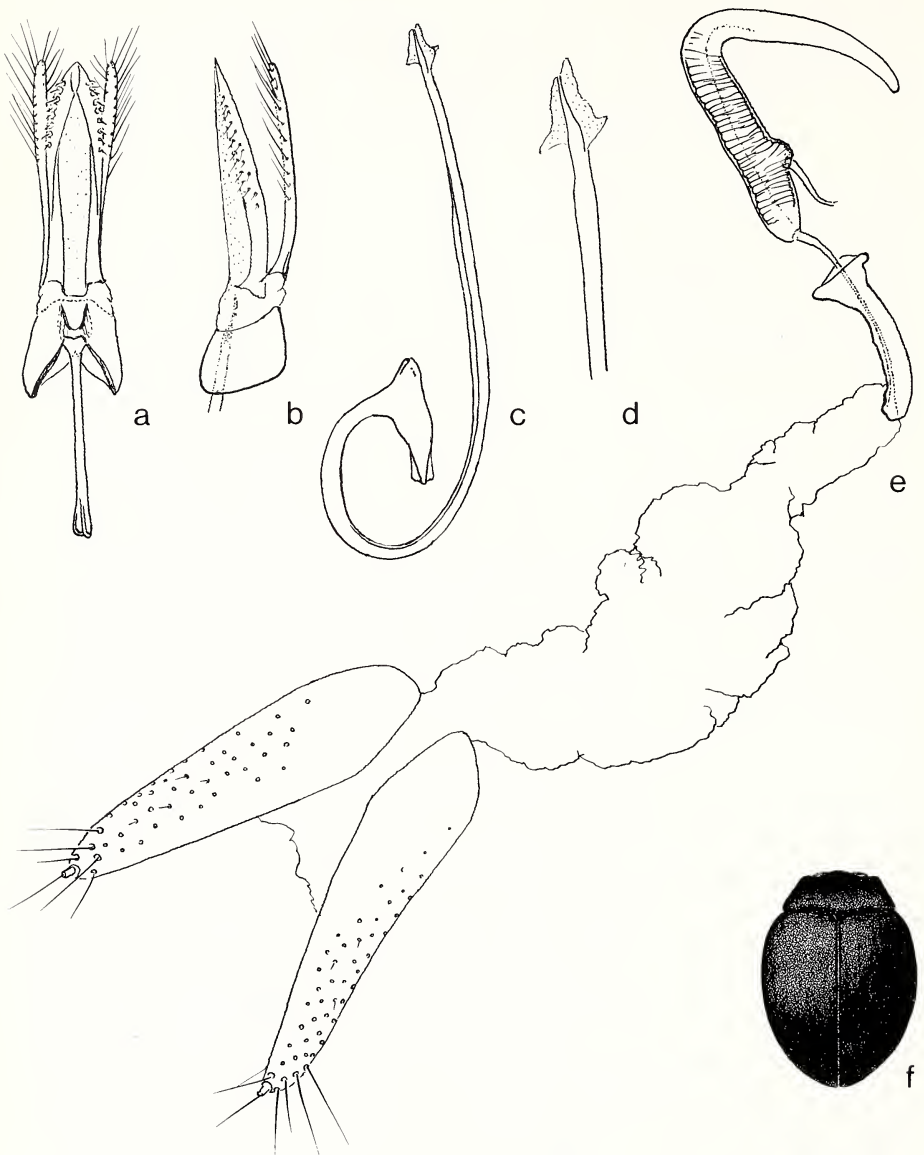


Fig. 37. *Zilus aterrimus*.

Distribution. Figure 39. Maryland to Florida, west to Wisconsin. Disjunct localities: LOUISIANA: Caddo Parish; East Baton Rouge Parish; Rapides Parish.

This eastern species has been confused with *Z. aterrimus* (Horn) although the distributions are disjunct. In addition to differences in male and female genitalia,

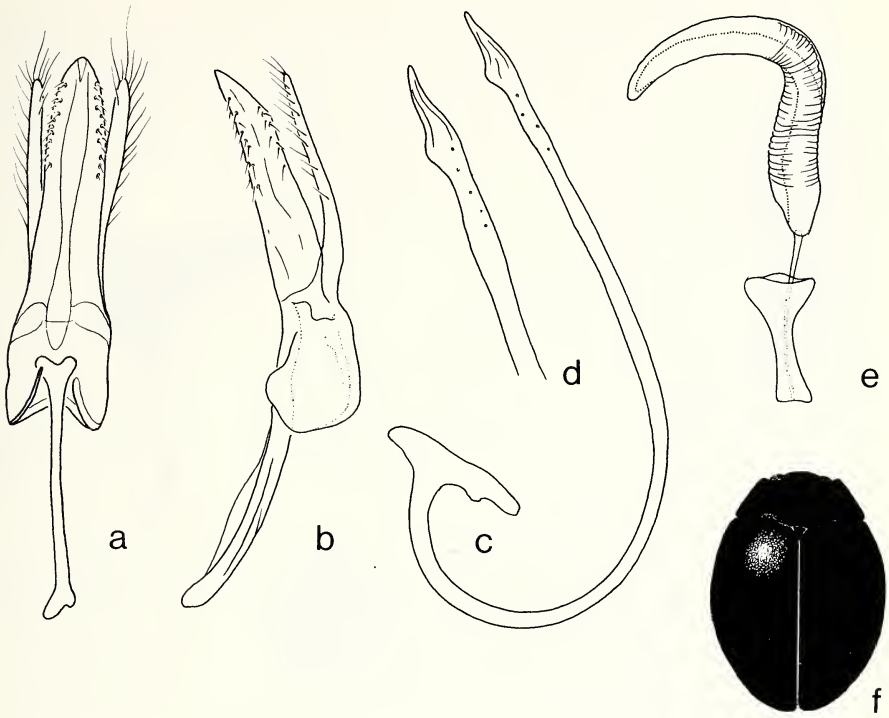


Fig. 38. *Zilus horni*.

these 2 species are also separable externally. *Zilus horni* is entirely black dorsally, and the pronotum is finely punctate medially. *Zilus aterrimus* is reddish brown dorsally, and the pronotum is closely, coarsely punctate throughout. The specific epithet is in honor of George H. Horn.

Zilus eleutherae (Casey), new combination

Fig. 40a-e; Map, Fig. 39

Scymnillus eleutherae Casey, 1899, p. 115—Korschefsky, 1931, p. 171—Blatchley, 1920, p. 44.

Diagnosis. Length 0.90 to 1.0 mm, width 0.78 to 0.80 mm. Form round, convex (Fig. 40e). Color purplish black; lateral pronotal border, ventral surface, and leg (except tarsus) dark brown; antenna, mouthparts and tarsus yellow. Male genitalia as in Figure 40a-c.

Discussion. This minute species was described from the Bahamas and first recorded from Florida by Blatchley (1920). The size and muted purplish black dorsum characterize *Z. eleutherae* in the North American fauna. There are 3 types in the Casey collection, the first of which I designate and label the lectotype and the other 2 as paralectotypes.

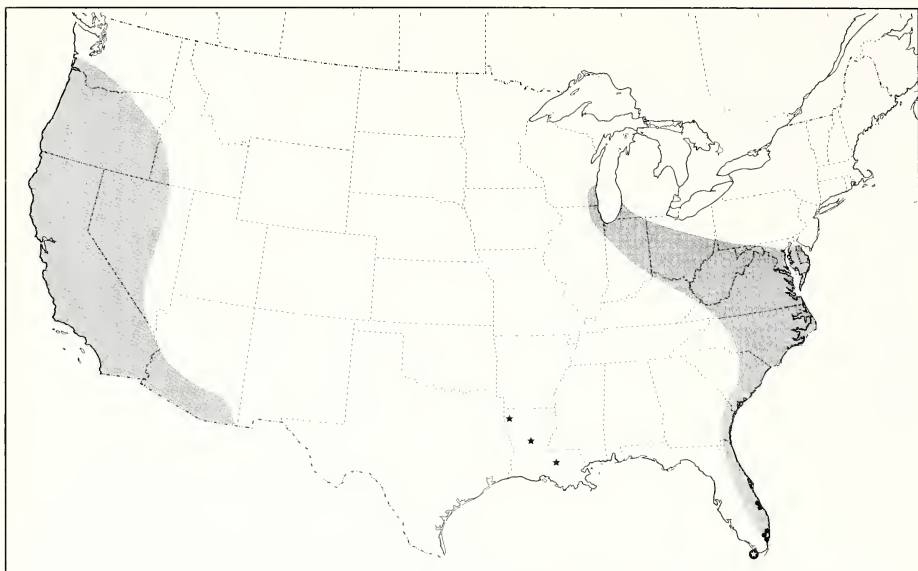


Fig. 39. Distribution. *Zilus aterrimus* (shaded, western); *Z. horni* (shaded, eastern; disjunct localities, star); *Z. eleutherae* (circled star); *Z. subtropicus* (dot).

Type locality. Eleuthera, Bahamas (lectotype here designated).

Type depository. USNM.

Distribution. Figure 39. FLORIDA: Cape Sable.

Zilus subtropicus (Casey), new combination

Fig. 41a–f; Map, Fig. 39

Delphastus subtropicus Casey, 1924, p. 170—Korschefsky, 1931, p. 221.

Scymnillodes subtropicus: Chapin, 1930, p. 493.

Diagnosis. Length 1.60 to 1.80 mm, width 1.28 to 1.42 mm. Form broad, oval (Fig. 40f). Color metallic purple or blue, pronotum often metallic green; ventral surface yellow to reddish piceous, leg and mouthparts yellowish brown. Male genitalia as in Figure 41a–d. Female genitalia as in Figure 41e.

Discussion. The metallic blue or purple dorsal color is very distinctive among North American coccinellids but is shared with several other members of this genus that occur in the West Indies. This species is apparently restricted to southern Florida but may also occur in the West Indies. The type specimen is a unique female in the Casey collection (holotype).

Type locality. Key West, Florida.

Type depository. USNM (35228).

Distribution. Figure 39. FLORIDA: Biscayne; Coral Gables; Davie; Florida City; Fort Pierce; Hialeah; Key West; Miami; Paradise Key; Vero Beach.

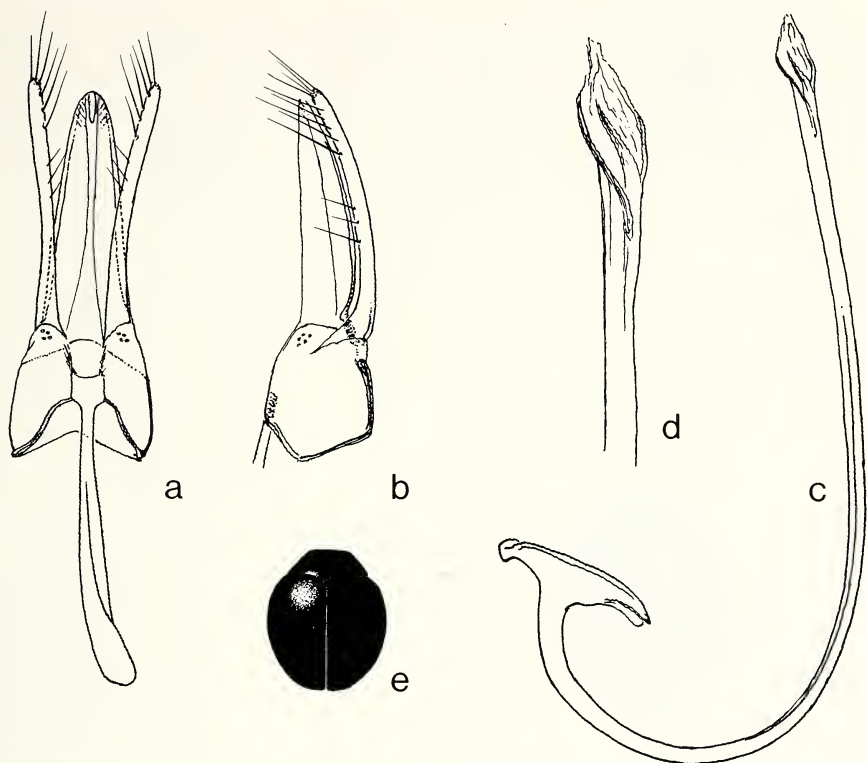


Fig. 40. *Zilus eleutherae*.

Genus *Zagloba* Casey

Zagloba Casey, 1899, p. 113—Leng, 1920, p. 214—Korschefsky, 1931, p. 172—Hatch, 1961, p. 154—Gordon, 1970g, p. 481. Type-species; *Cephaloscymnus ornatus* Horn, by subsequent designation of Korschefsky, 1931.

Zilini with length usually less than 2.00 mm. Dorsal surface without metallic tint, pubescence dense, mostly erect, present throughout. Antenna short, compact, club distinctly 3-segmented (Fig. 42a). Apical segment of maxillary palpus not securiform, sides nearly parallel, narrowed slightly at apex (Fig. 42b). Gena extending onto eye. Tarsal claw with basal tooth (Fig. 42c). Postcoxal line complete or incomplete (Figs. 43f, 46f), never reaching apex of first abdominal sternum. Male genitalia simple, symmetrical. Female genitalia with infundibulum usually large, flattened laterally, sperm duct very short (Fig. 44e).

The described species of *Zagloba* occur from Venezuela and Colombia north to Oregon and Pennsylvania with 3 known from the neotropics and 4 from the United States. These species are not commonly collected and I have not seen host data for

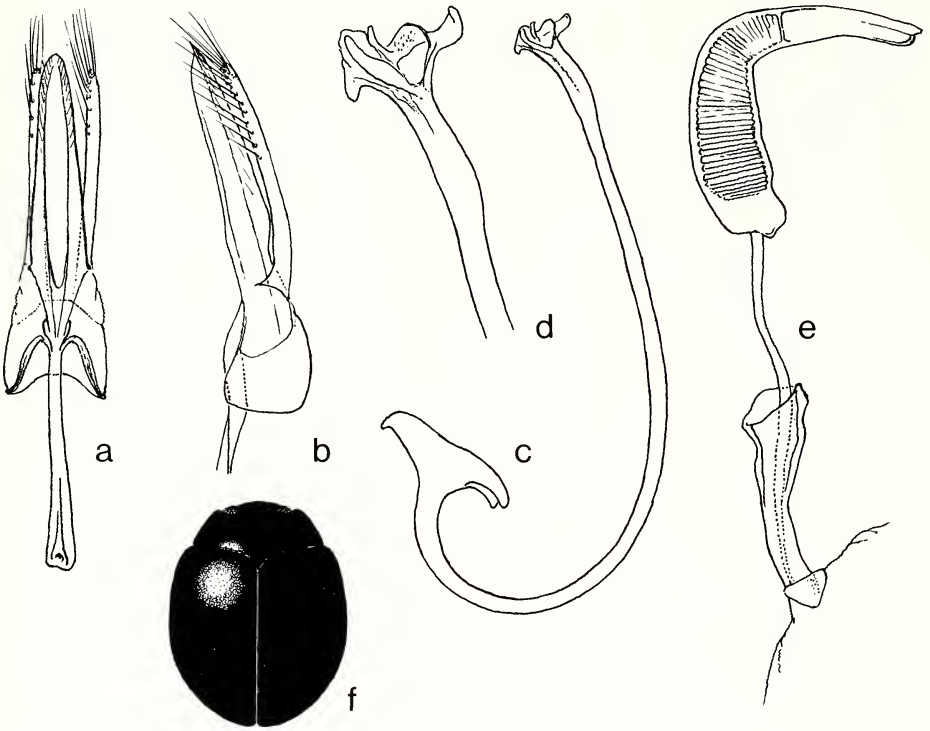


Fig. 41. *Zilus subtropicus*.

any of the United States species. At least one Neotropical species, *Z. obscura* Gordon, has been taken feeding on "scale insects" on banana and orange. We may presume, therefore, that all species of *Zagloba* are likely to be scale predators. *Zagloba* has not been taxonomically treated as a whole, but Gordon (1970g) reviewed the Central and South American species.

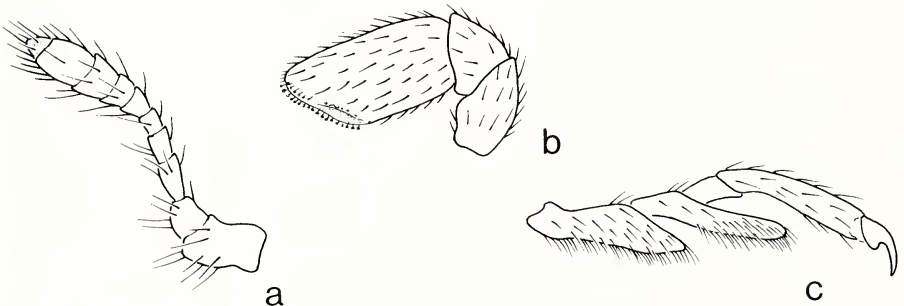


Fig. 42. *Zagloba* sp. a. Antenna. b. Maxillary palpus. c. Tarsus.

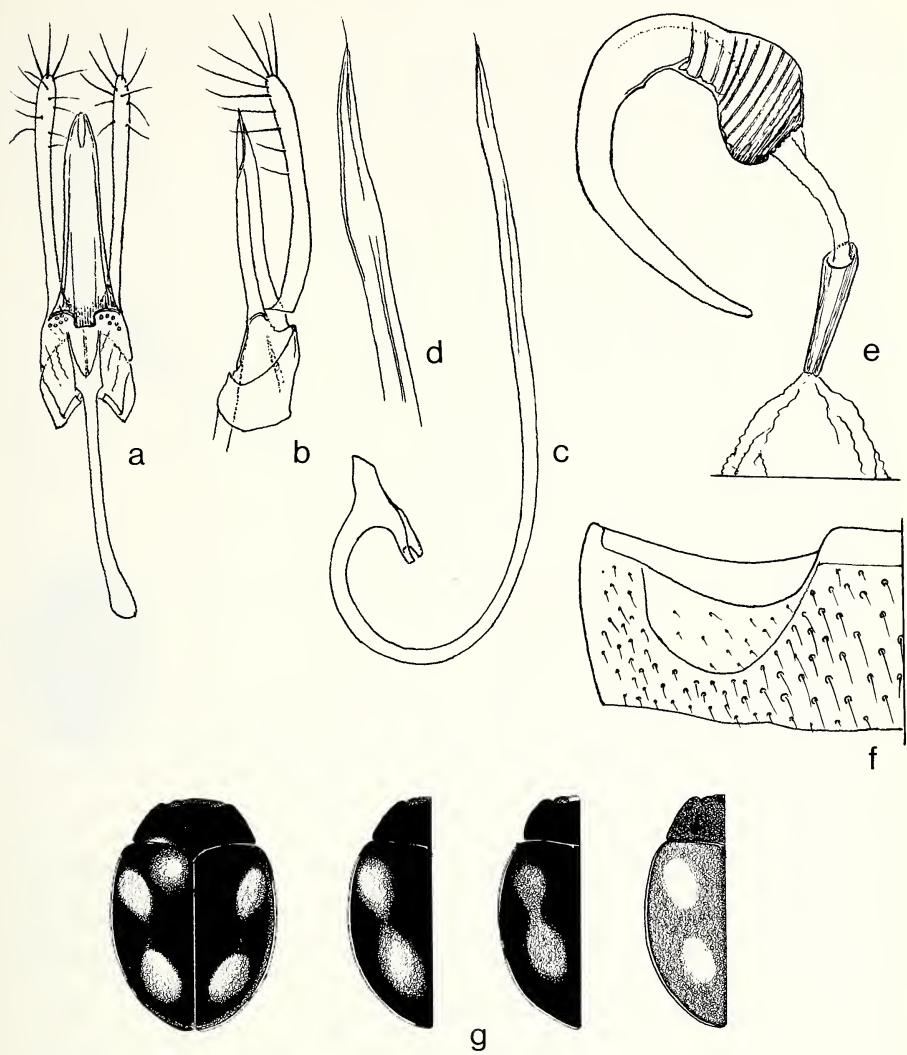


Fig. 43. *Zagloba ornata*.

KEY TO SPECIES OF *Zagloba*

- 1. Pronotum entirely yellowish red; elytron black or dark brown (Fig. 44f); Florida *bicolor* Casey
- Pronotum entirely black or brown, at most with some lateral paler areas; elytron uniformly dark or dark with yellow maculation; not known from Florida 2
- 2(1). Elytron brown with yellow maculation; Pacific Coast, Arizona *ornata* (Horn)
- Elytron black or brown, immaculate; not known from the Pacific Coast 3

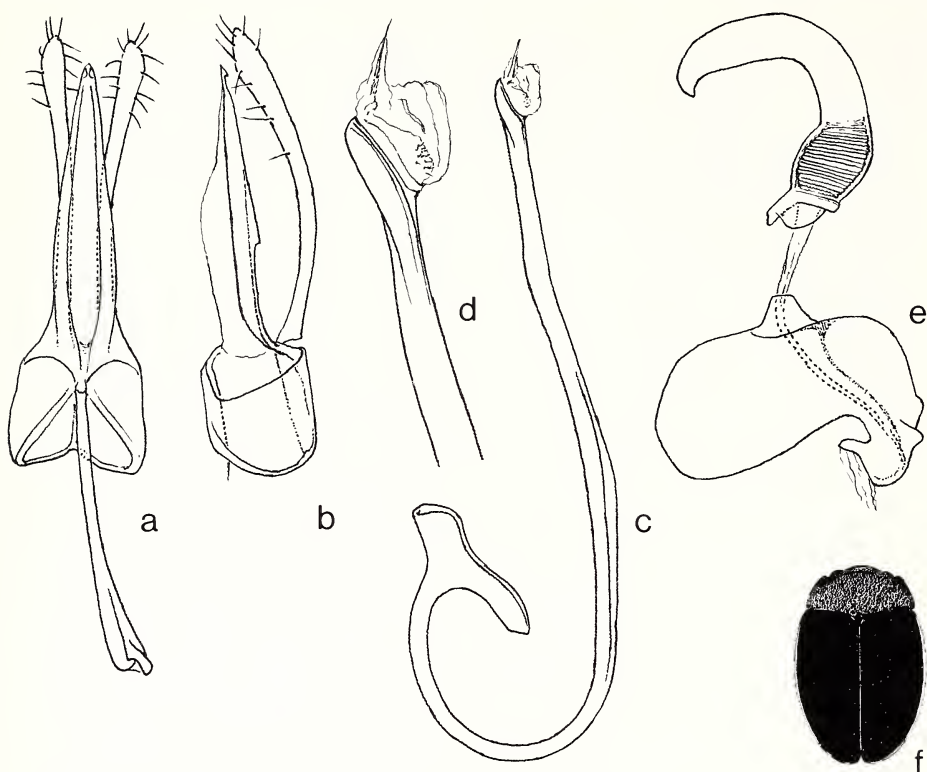


Fig. 44. *Zagloba bicolor*.

- 3(2). Punctures within arc of postcoxal line coarse, distinct; pronotum paler than elytron *hystrix* Casey
 — Punctures within arc of postcoxal line fine, indistinct; pronotum and elytron concolorous *satana*, n. sp.

Zagloba ornata (Horn)

Fig. 43a–g; Map, Fig. 45

Cephaloscymnus ornatus Horn, 1895, p. 111.

Zagloba ornata: Casey, 1899, p. 114—Leng, 1920, p. 214—Korschefsky, 1931, p. 172—Hatch, 1961, p. 154.

Zagloba laticollis Casey, 1899, p. 114—Leng, 1920, p. 214. **New Synonymy.**

Zagloba orbipennis Casey, 1899, p. 114—Leng, 1920, p. 214. **New Synonymy.**

Diagnosis. Length 1.75 to 2.00 mm, width 1.43 to 1.65 mm. Form elongate, oval. Color dark brown to light brown; antenna, mouthparts, and leg yellowish brown; pronotum often with yellowish brown lateral areas; elytron usually with 2 nebulous, yellow spots feebly connected (Fig. 43g), but pattern variable as in Figure 43g. Postcoxal line complete (*Pullus* type) in both sexes (Fig. 43f). Male genitalia as in Figure 43a–d. Female genitalia with infundibulum small, elongate (Fig. 43e).

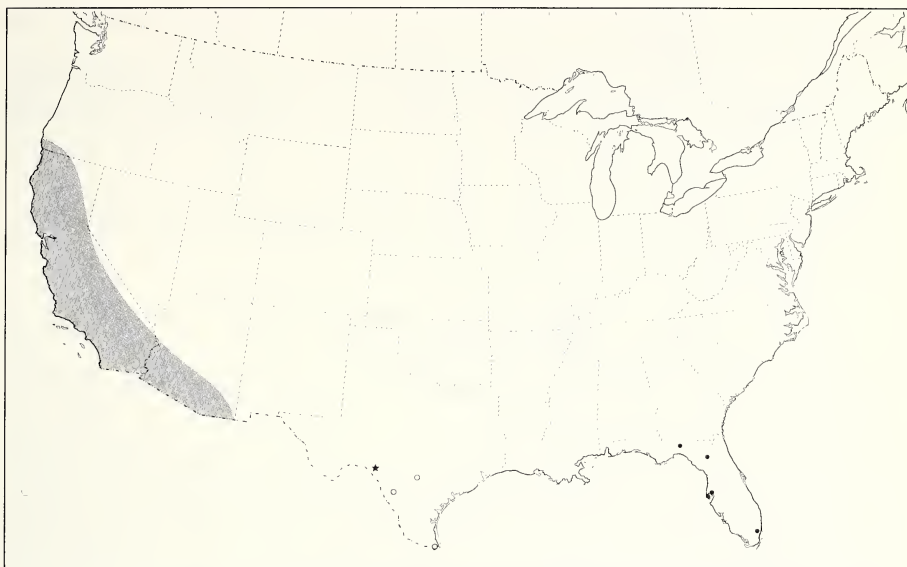


Fig. 45. Distribution. *Zagloba ornata* (shaded); *Z. bicolor* (dot); *Z. hystrix* (open circle); *Z. satana* (star).

Discussion. This species is unique among North American members of the genus in having the postcoxal line complete in both sexes and in having a simple, reduced infundibulum. *Zagloba laticollis* Casey and *Z. orbipennis* Casey are conspecific with *Z. ornata*, and I place both names as junior synonyms. Both species were described from unique specimens in the Casey collection which must be considered holotypes. *Zagloba ornata* was described from several specimens, all from California, and I designate and label as the lectotype a female in the Horn collection labeled "702/Aug./Siskiyou Co., Cal./lectotype 3186(red paper)/C. ornatus Horn." Three other type specimens from various California localities are designated as paralectotypes.

Type locality. Of *ornata*, Siskiyou Co., California (lectotype here designated); of *laticollis*, California; of *orbipennis*, Healdsburg, Sonoma Co., California.

Type depository. Of *ornata*, MCZ; of *laticollis* (35234) and *orbipennis* (35233), USNM.

Distribution. Figure 45. Southern Arizona and California, north to southwestern Oregon.

Zagloba bicolor Casey
Fig. 44a-f; Map, Fig. 45

Zagloba bicolor Casey, 1899, p. 114—Leng, 1920, p. 214—Korschefsky, 1931, p. 172.

Diagnosis. Length 1.65 to 1.85 mm, width 1.22 to 1.33 mm. Form elongate, oval (Fig. 44f). Color pale yellowish brown; pronotum yellowish red; elytron black or dark brown; meso- and metasternum and first abdominal sternum dark brown. Postcoxal

line incomplete in both sexes. Male genitalia as in Figure 44a-d. Female genitalia with infundibulum large, flattened laterally (Fig. 44e).

Discussion. This species is apparently restricted to Florida, and the color pattern alone will distinguish it from other members of the genus. The type is a unique (holotype) female in the Casey collection.

Type locality. Capron, Florida.

Type depository. USNM (35236).

Distribution. Figure 45. FLORIDA: Alachua Co., Gainesville; Dunedin; Jefferson Co., Monticello; Miami; Tampa.

Zagloba hystrix Casey
Fig. 46a-g; Map, Fig. 45

Zagloba hystrix Casey, 1899, p. 114—Leng, 1920, p. 214—Korschefsky, 1931, p. 172.

Diagnosis. Length 1.45 to 1.75 mm, width 1.35 to 1.50 mm. Form rounded, pronotum and elytron abruptly discontinuous in outline (Fig. 46g). Color medium reddish brown; antenna, leg and mouthparts yellowish brown; elytron dark brown to black. Postcoxal line incomplete in both sexes (*Scymnus*, s. str., type) (Fig. 46f). Male genitalia as in Figure 46a-d. Female genitalia as in Figure 46e.

Discussion. This species is difficult to separate from *Z. satana*, n. sp., but the pronotum is usually distinctly paler than the elytron in this species, and the abdominal punctation is definitely coarser than in *satana*. There are 6 type specimens of *hystrix* in the Casey collection, and the first of these, a female, is designated and labeled as the lectotype. The other 5 types bear the same data and are designated as paralectotypes.

Type locality. Brownsville, Texas (lectotype here designated).

Type depository. USNM (35237).

Distribution. Figure 45. TEXAS: Brownsville; San Antonio; Zavalla Co., Nueces River.

Zagloba satana, new species
Fig. 47a-h; Map, Fig. 45

Description. Male, length 1.65 mm, greatest width 1.32 mm. Form rounded (Fig. 47h), outline of pronotum and elytron strongly discontinuous. Color black; ventral surface and lateral border of pronotum dark reddish brown; antenna, mouthparts, and leg yellowish brown. Dorsum densely pubescent with grayish white hairs, hairs erect on pronotum and elytron, appressed on head. Head densely, finely punctured, punctures separated by a diameter or less. Pronotum $\frac{1}{2}$ the length of elytron; punctures fine, separated by twice a diameter on disc, becoming contiguous along lateral margin. Elytral punctation finer than on pronotum, punctures separated by less than to twice a diameter. Metasternum smooth, nearly impunctate medially, punctures becoming coarse and dense laterally. Abdominal punctation fine, punctures within arc of postcoxal line indistinct; postcoxal line complete (Fig. 47g). Genitalia as in Figure 47a-d.

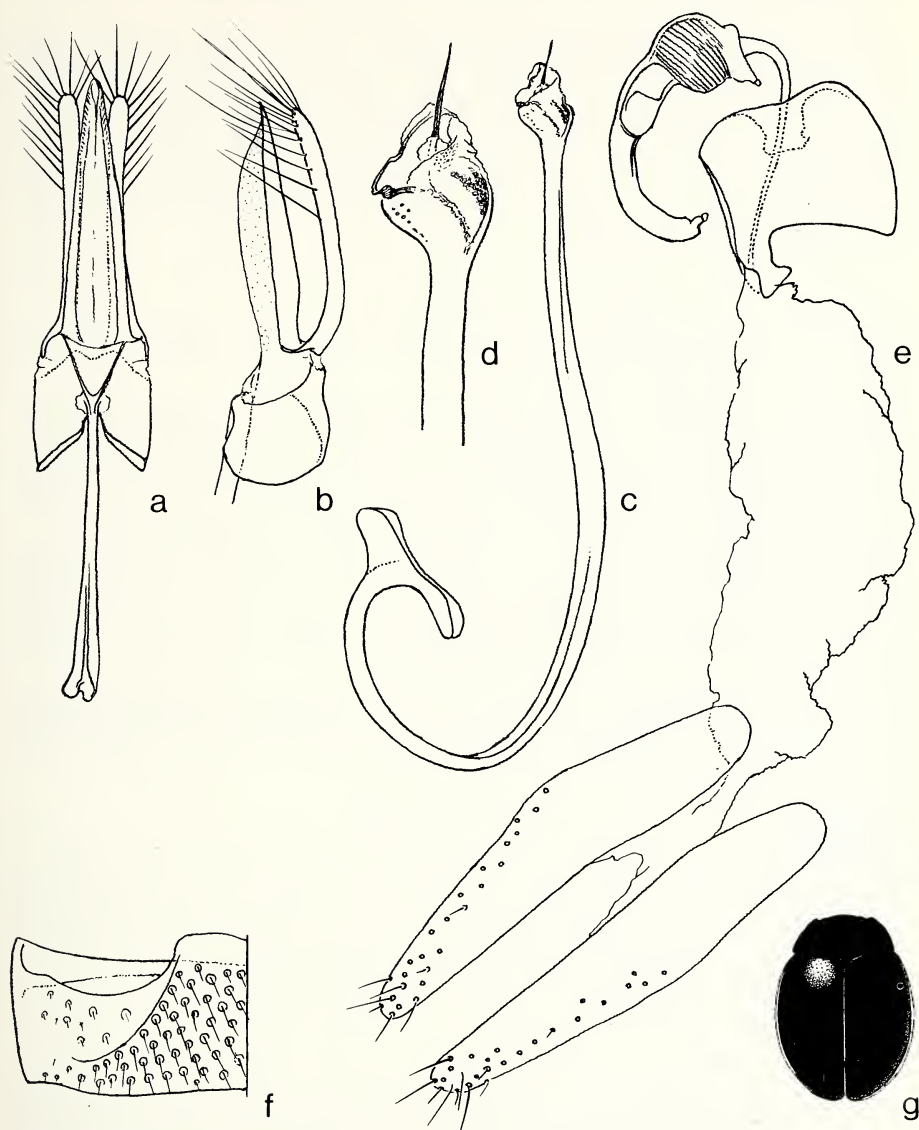


Fig. 46. *Zagloba hystrix*.

Female, similar to holotype except length 1.60 mm, width 1.29 mm; postcoxal line incomplete (Fig. 47f); genitalia as in Figure 47e.

Variation. Length 1.45 to 1.75 mm, width 1.20 to 1.37 mm.

Holotype. Male. TEXAS: Devils River, V-2-07, E. A. Schwarz coll (USNM 101331).

Allotype. Female. Same data as holotype except "on *Pithecolobium*". (USNM).

Paratypes. (Fig. 45) Total 8. TEXAS: "Texas"; Devils River, V-4-07, FC Pratt Collector; same data as holotype; Laredo, 28-5, Hubbard and Schwarz. (USNM).

This is the only known species of *Zagloba* exhibiting sexual dimorphism in the shape of the postcoxal line. The punctuation, both dorsal and ventral, is obviously finer than in *hystrix* which *satana* most closely resembles. Genitalia should be examined in members of this group to ensure accurate determination. The specific epithet refers to the type locality.

Tribe Stethorini

Stethorini Dobzhansky, 1924, p. 20—Korschefsky, 1931, p. 110—Kapur, 1948, 302—Sasaji, 1968, p. 23—J. Chapin, 1974, p. 16.

Scymninae of small size, less than 2.0 mm; pubescent dorsally. Antenna 11-segmented; inserted between eye and clypeus, clypeus not emarginate around base. Maxillary palpus with terminal segment convergent apically. Prosternum lobed anteriorly, partially concealing mouthparts; intercoxal process without carinae. Leg free, simple; tarsus cryptotetramerous or trimerous. Abdomen with 6 visible sterna.

This tribe contains a single genus, *Stethorus*, which has usually been placed in the tribe Scymnini. Dobzhansky (1924) erected the tribe Stethorini, but Korschefsky (1931) synonymized Stethorini with Scymnini, and Kapur (1948) agreed with this placement. Sasaji (1968) considered Stethorini a valid tribe and I concur with his treatment.

Stethorini is easily separated from all other tribes of Scymninae because the clypeus is not emarginate around the antennal bases, and the prosternum is arcuately produced in front, partly concealing the mouthparts.

Genus *Stethorus* Weise

Stethorus Weise, 1885a, p. 65—Casey, 1899, p. 135—Kapur, 1948, p. 300—Wingo, 1952, p. 19—J. Chapin, 1974, p. 16—Belicek, 1976, p. 297—Gordon and Anderson, 1979, p. 61—Gordon and Chapin, 1983, p. 229. Type-species; *Stethorus punctillum* Weise, by subsequent designation of Korschefsky, 1931.

Nephopullus Brethes, 1925, p. 167—Kapur, 1948, p. 300. Type-species; *Nephopullus darwini* Brethes, by subsequent designation of Korschefsky, 1931.

Body color black except antenna and mouthparts yellow, legs often yellow. Head with moderately coarsely faceted eye; clypeus truncate anteriorly, anterolateral angle rounded. Antenna short, 11-segmented (Fig. 48a); inserted between eye and clypeus, clypeus not emarginate around base. Maxillary palpus with apical segment oblong, obliquely truncate and narrower toward apex (Fig. 48b). Prosternum without carinae, produced anteriorly to partly conceal mouthparts (Fig. 48c). Tarsus trimerous or cryptotetramerous; tarsal claw bifid (Fig. 48d), inner claw shorter in male than in female. Abdomen with postcoxal line on basal sternum complete (Fig. 49e). Male genitalia with basal lobe symmetrical or asymmetrical. Female spermathecal capsule present or absent, genital plate small, not triangular (Fig. 48e).

There are 65 described species in this genus, and they are found in most parts of the world; 6 species occur in America north of Mexico. Most coccinellids are pre-

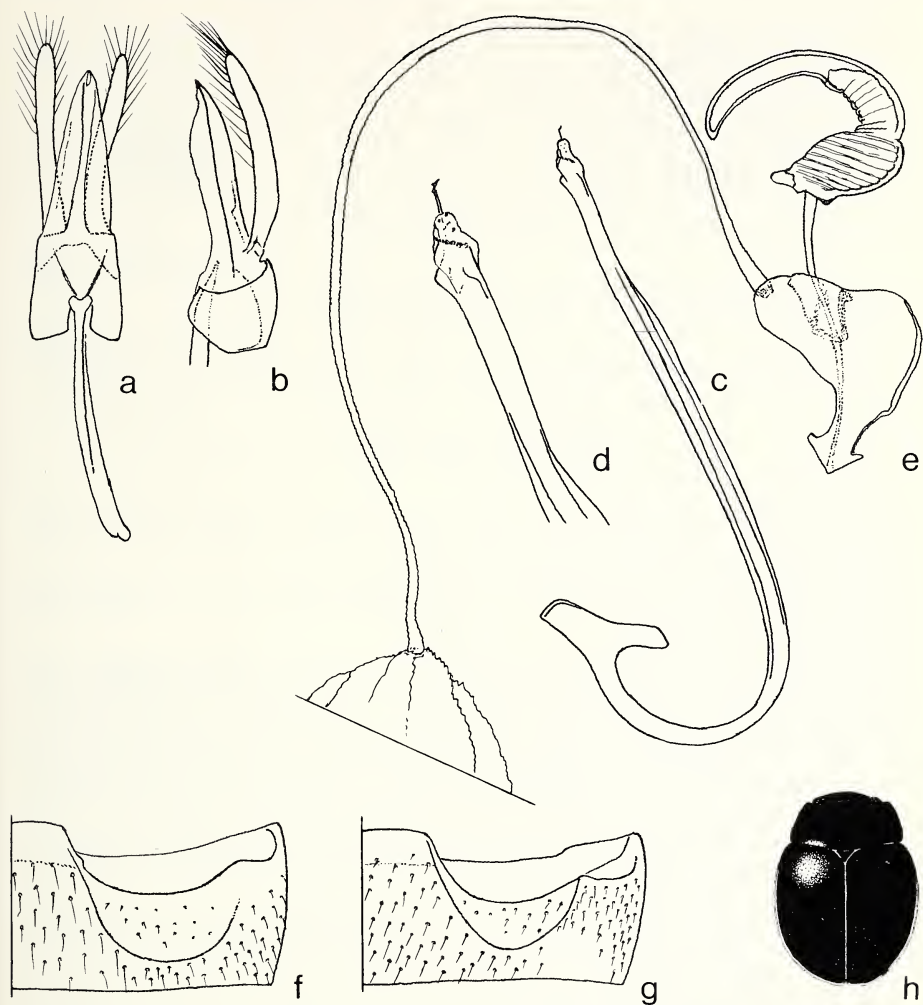


Fig. 47. *Zagloba satana*.

daceous on insects of the order Homoptera, and some are plant feeders, but species of *Stethorus* feed almost exclusively on tetranychid mites. The western Hemisphere species were treated by Gordon and Chapin (1983), see that publication for more detailed information.

KEY TO SPECIES OF *Stethorus*

- 1. Postcoxal line not arched beyond middle of first abdominal sternum (figs. 54d); basal abdominal sternum densely, coarsely punctured 2
- Postcoxal line arched beyond middle of first abdominal sternum (Figs. 51e, 53e); basal abdominal sternum sparsely, finely punctured 3

- 2(1). Postcoxal line short, arc not reaching middle of first abdominal sternum; elytral punctures larger than pronotal punctures *punctillum* Weise
 – Postcoxal line usually arched to middle of first sternum or nearly so (Fig. 53e); elytral and pronotal punctures equal in size *punctum punctum* (LeConte)
 3(1). Leg (except tarsus) black or brown; punctures on abdominal sterna coarse, dense (Fig. 53g) *punctum picipes* Casey
 – Leg with at least tibia yellow; punctures on abdominal sterna fine, sparse (Fig. 49e) 4
 4(3). Clypeal apex truncate; lateral pronotal punctures dense, contiguous *pinachi* Gordon and Chapin
 – Clypeal apex emarginate; lateral pronotal punctures sparse, not contiguous 5
 5(4). Elytral pubescence reddish brown; pronotal punctures fine, sparse *caseyi* Gordon and Chapin
 – Elytral pubescence yellowish white; pronotal punctures coarse, not sparse *utilis* (Horn)

Stethorus utilis (Horn)
 Fig. 49a–c; Map, Fig. 52

Scymnus utilis Horn, 1895, p. 107.

Stethorus utilis: Casey, 1899, p. 136—Korschefsky, 1931, p. 112—J. Chapin, 1974, p. 17—Gordon and Chapin, 1983, p. 241.

Stethorus atomus Casey, 1899, p. 136—Korschefsky, 1931, p. 111—Gordon and Chapin, 1983, p. 241.

Diagnosis. Length 1.0 to 2.0 mm, width 0.75 to 1.0 mm. Form elongate, oval. Color black; antenna, mouthparts, and leg yellow except basal $\frac{3}{4}$ of femur brown. Dorsal pubescence moderately long, semierect, mostly yellowish white with traces of brown. Head finely punctured, punctures separated by a diameter or less; pronotal punctures coarse, slightly larger than elytral punctures, separated by about a diameter on disc, less than a diameter laterally; elytral punctures shallow, separated by one to 2 times a diameter; metasternum with fine, dense punctures except nearly impunctate on basomedian area; abdominal sterna finely, sparsely punctured. Arc of postcoxal line extending $\frac{3}{4}$ length of first abdominal sternum, angulate (Fig. 49e). Apex of 6th abdominal sternum truncate. Male genitalia as in Figure 49a–c. Female spermathecal capsule as in Figure 49d.

Discussion. This species is most easily confused with *S. caseyi*, but the dorsal pubescence of *S. caseyi* is reddish brown. The male genitalia are similar in these 2 species, but the basal lobe in *S. caseyi* is more obviously triangular and shorter than that of *S. utilis*.

Type locality. Of *utilis*, Barstow, Florida; of *atomus*, Columbus, Texas.

Type depository. Of *utilis*, MCZ; of *atomus*, USNM.

Distribution. Figure 52. North Carolina to Florida, west to east Texas.

Stethorus caseyi Gordon and Chapin
 Fig. 50a–f; Map, Fig. 52

Stethorus Caseyi Gordon and Chapin, 1983, p. 241.

Diagnosis. Length 1.10 to 1.31 mm, width 0.75 to 1.05 mm. Form short, rounded (Fig. 50f). Color black; antenna, mouthparts and leg except basal $\frac{3}{4}$ of femur yellow.

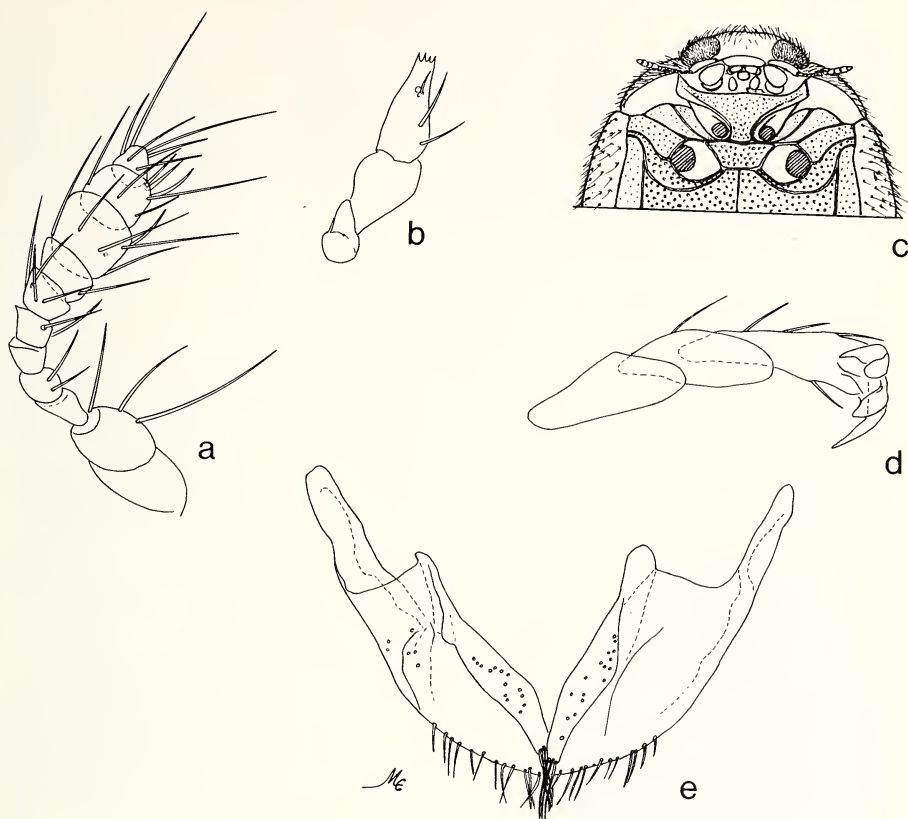


Fig. 48. *Stethorus* sp. a. Antenna. b. Maxillary palpus. c. Venter. d. Tarsus. e. Genital plates.

Dorsal pubescence long, nearly erect, reddish brown. Head shiny, finely punctured, punctures separated by a diameter; pronotum with punctures coarser than on head, punctures separated by one to 3 times a diameter; elytral punctation coarse, punctures separated by about a diameter; metasternum with fine punctures medially, punctures becoming coarse and dense laterally. Abdominal sterna with fine punctures sparse on first sternum, dense on remaining sterna. Arc of postcoxal line extending $\frac{3}{4}$ length of first abdominal sternum, angulate (Fig. 50e). Apex of 6th abdominal sternum feebly notched. Male genitalia as in Figure 50a–c. Female genitalia as in Figure 50d.

Discussion. The round form, reddish brown pubescence, and sparsely punctured pronotum will separate *S. caseyi* from *S. utilis* which it most closely resembles.

Type locality. Devils River, Texas.

Type depository. USNM (10061).

Distribution. Figure 52. ARIZONA: Catalina Springs; Chiricahua Mountains; Oracle; Santa Rita Mountains. NEW MEXICO: Albuquerque. TEXAS: Brownsville; Devils River; El Paso; Laredo; San Antonio; San Diego; Uvalde. UTAH: Leeds; St. George.

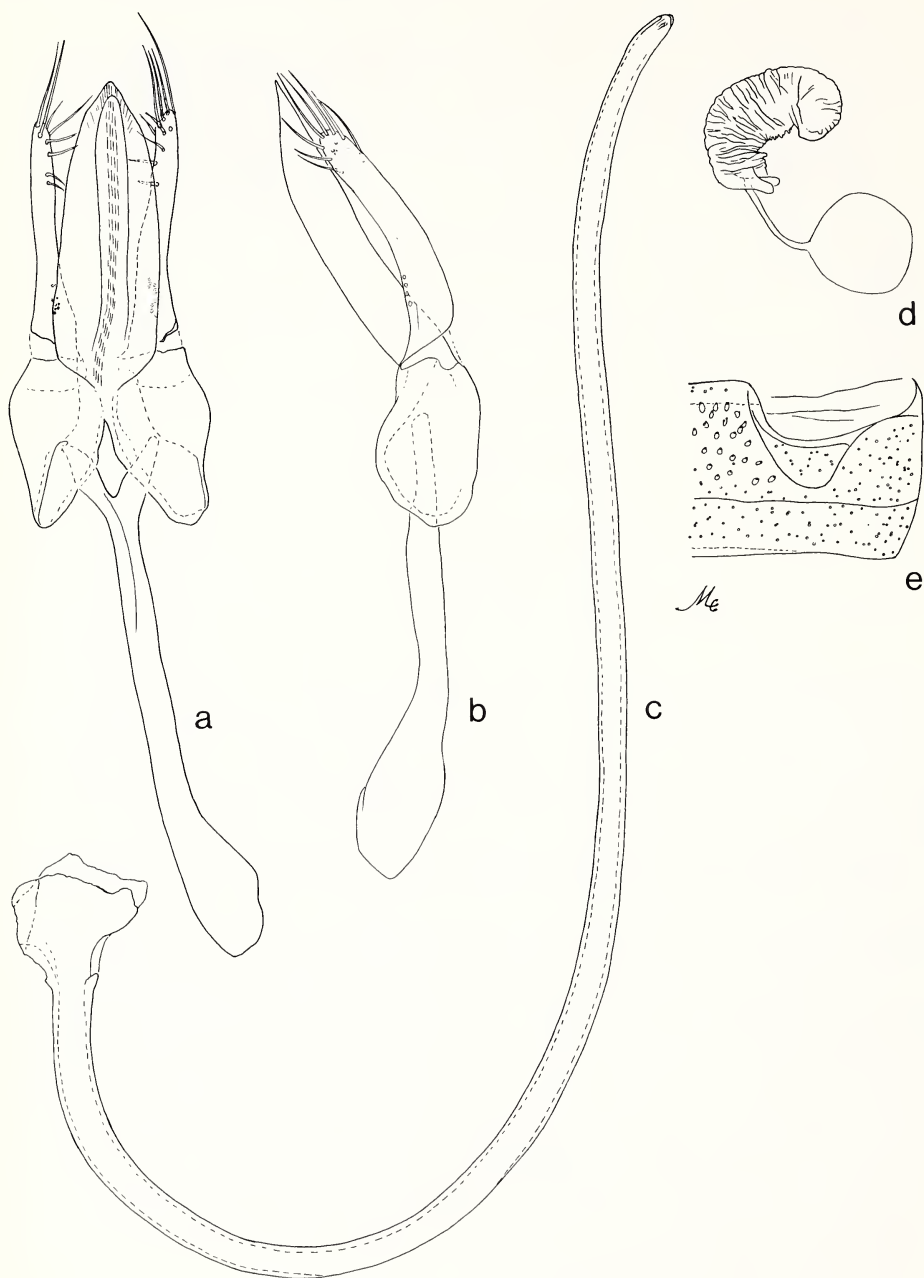


Fig. 49. *Stethorus utilis*.

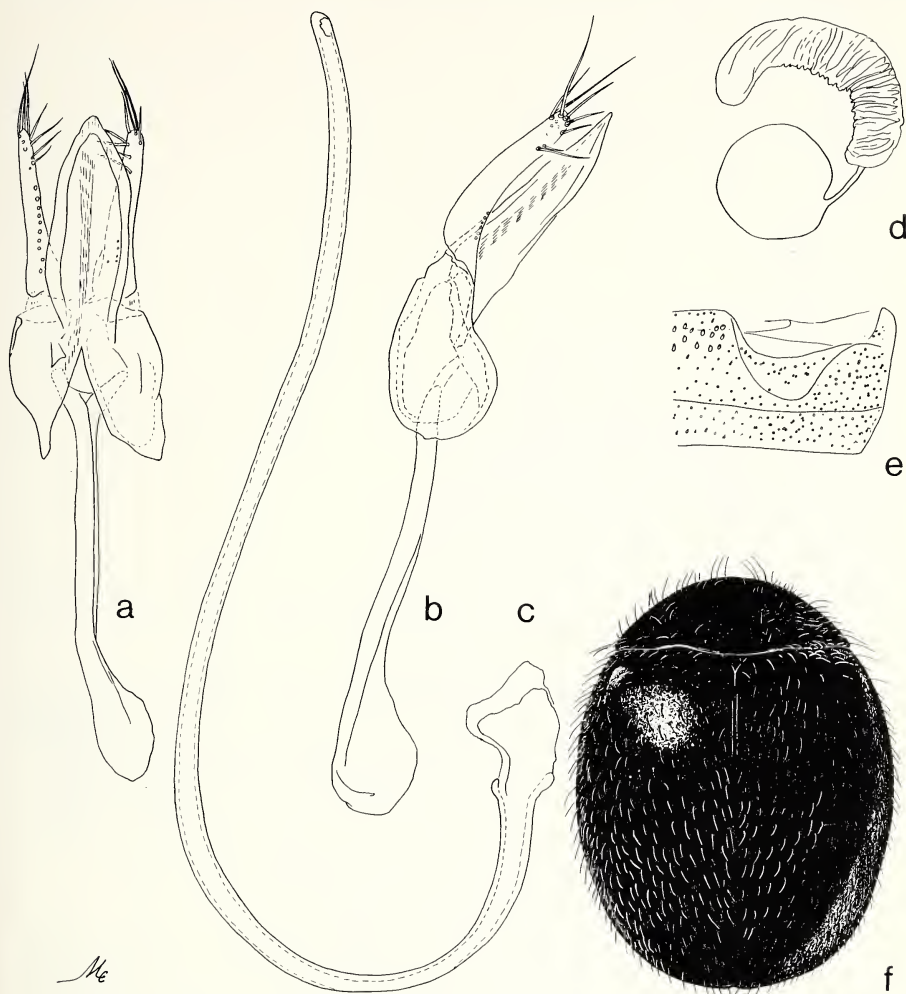


Fig. 50. *Stethorus caseyi*.

Stethorus pinachi Gordon and Chapin

Fig. 51a-e; Map, Fig. 52

Stethorus pinachi: Gordon and Chapin, 1983, p. 250.

Diagnosis. Length 1.25 to 1.40 mm, width 0.80 to 1.10 mm. Form elongate, oval. Color black; antenna, mouthparts, and leg yellow except basal $\frac{3}{4}$ of femur brown. Dorsal pubescence short, semierect, yellowish white with traces of brown. Head shiny, finely punctured, punctures separated by a diameter or more; pronotal punctation coarser than on head, discal punctures separated by a diameter, lateral punctures

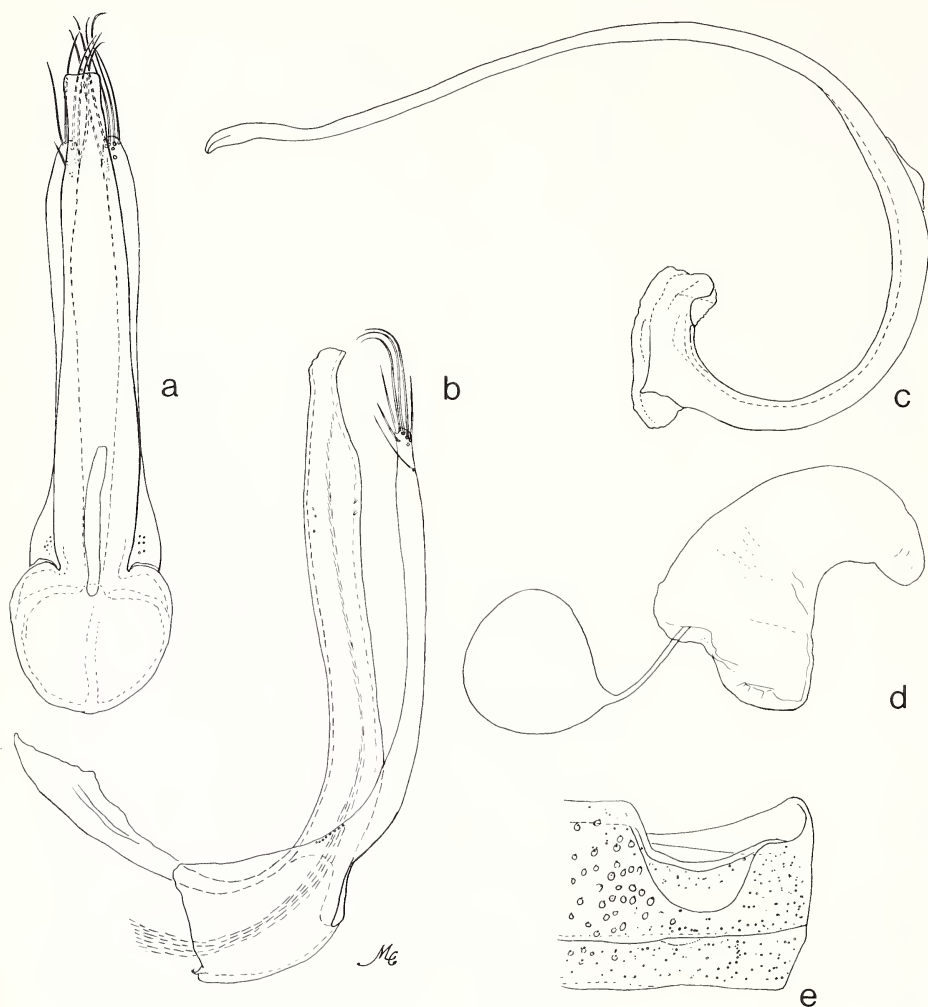


Fig. 51. *Stethorus pinachi*.

contiguous; clytral punctation very coarse, punctures separated by less than a diameter. Metasternum coarsely and densely punctured laterally, punctures finer and sparser medially; abdominal sterna with fine punctures sparse on first sternum, dense on remaining sterna. Arc of postcoxal line extending more than $\frac{3}{4}$ length of first abdominal sternum, rounded (Fig. 51e). Sixth sternum feebly emarginate apically. Male genitalia as in Figure 51a-c. Female genitalia as in Figure 51d.

Discussion. This species is quite distinctive in the form of the male genitalia which are most similar to those of *S. punctum*. The truncate apex of the clypeus will

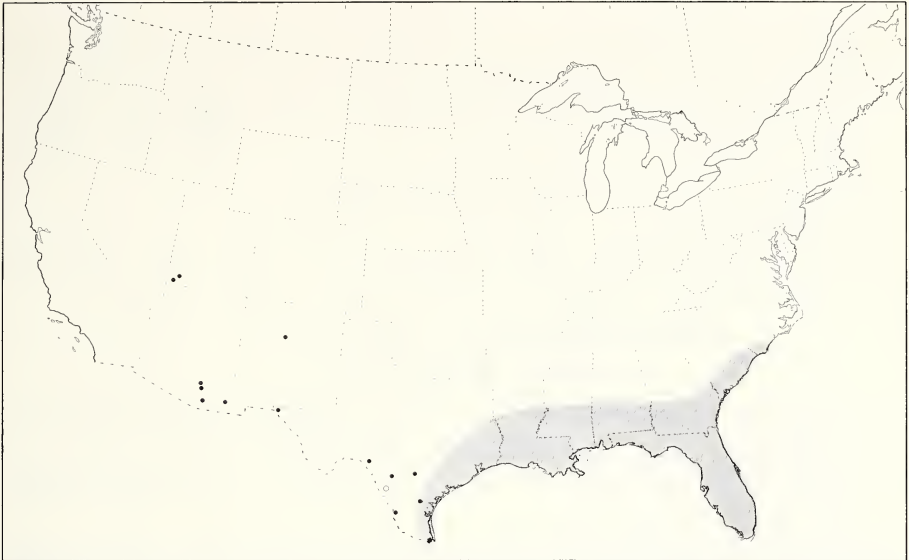


Fig. 52. Distribution. *Stethorus utilis* (shaded); *S. caseyi* (dot); *S. pinachi* (open circle).

distinguish *S. chapini* from *S. utilis* which it most closely resembles in external appearance.

Type locality. Carrizo Springs, Dimmit Co., Texas.

Type depository. USNM (100664).

Distribution. Figure 52. TEXAS: type locality.

Stethorus punctum punctum (LeConte)

Fig. 53a-e; Map, Fig. 55

Scymnus punctum LeConte, 1852, p. 141—Horn, 1895, p. 106.

Stethorus punctum: Casey, 1899, p. 136—Korschefsky, 1931, p. 112—Wingo, 1952, p. 27—J. Chapin, 1974, p. 17—Gordon and Chapin, 1983, p. 250.

Diagnosis. Length 1.35 to 1.55 mm, width 0.95 to 1.15 mm. Form elongate, oval. Color black; antenna, mouthparts, and leg yellow except femur usually brown. Dorsal pubescence short, semierect, yellowish white. Head finely punctured, punctures separated by more than a diameter; pronotum finely, densely punctured, punctures separated by a diameter on disc, contiguous laterally; elytral punctures subequal in size to those on pronotum, separated by a diameter or less; metasternum coarsely punctured anteriorly and laterally; abdominal sterna with coarse, dense punctures separated by less than a diameter. Arc of postcoxal line usually reaching middle of basal abdominal sternum, sometimes shorter (Fig. 53e). Apex of 6th abdominal sternum notched. Male genitalia as in Figure 53a-c. Female spermathecal capsule as in Figure 53d.

Discussion. This species is native to North America, but somewhat difficult to distinguish from the introduced *punctillum* without examination of genitalia which are highly distinctive in the males. The postcoxal line is shorter in *S. punctillum* than in *S. punctum*, and the elytral punctures are distinctly larger than the pronotal punctures in *S. punctillum*, nearly equal in *S. punctum*. The female of *punctillum* lacks a spermathecal capsule.

Type locality. Ontario, northern shore of Lake Superior.

Type depository. MCZ.

Distribution. Figure 55. Southeastern Canada to North Carolina, west to Montana and Colorado.

Stethorus punctum picipes Casey

Fig. 53f, g; Map, Fig. 55

Stethorus picipes Casey, 1899, p. 136—Korschefsky, 1931, p. 112—Hatch, 1961, p. 149—Belicek, 1976, p. 298—Gordon and Chapin, 1983, p. 252.

Stethorus brevis Casey, 1899, p. 136—Korschefsky, 1931, p. 111—Gordon and Chapin, 1983, p. 252.

Diagnosis. Description as for *punctum* except the leg black or dark brown (except tarsus), the ventral punctation is noticeably more coarse and dense, and the postcoxal line (Fig. 53g) extends beyond the middle of the basal abdominal sternum. Female spermathecal capsule as in Figure 53f.

Discussion. The male and female genitalia are identical in *punctum* and *picipes*, but the 2 nominate forms can be distinguished on the basis of the characters mentioned above. I prefer to treat them as subspecies with *punctum* occurring from the east coast to Colorado and Montana and *picipes* occurring from California and British Columbia to Idaho and Alberta.

Type locality. Of *picipes*, Santa Rosa, Sonoma Co., California; of *brevis*, Siskiyou Co., California.

Type depository. Of *picipes* and *brevis*, USNM.

Distribution. Figure 55. Idaho to British Columbia, south to southern California.

Stethorus punctillum Weise

Fig. 54a-d; Map, Fig. 56

Stethorus punctillum Weise, 1891, p. 391 (in Reitter et al.)—Casey, 1899, p. 136—Korschefsky, 1931, p. 112—Kapur, 1948, p. 302—Hatch, 1961, p. 149—Belicek, 1976, p. 298—Gordon and Chapin, 1983, p. 270.

Coccinella minima Rossi, 1794, p. 89 (not *Coccinella minima* Muller, 1776).

Scymnus (Stethorus) minimus: Weise, 1885a, p. 74.

Coccinella pusilla Herbst, 1797, p. 346 (not *Coccinella pusilla* Muller, 1776).

Coccinella atra Illiger, 1798, p. 413 (not *Coccinella atra* Gmelin, 1790).

Stethorus ater: Korschefsky, 1931, p. 112.

Diagnosis. Length 1.35 to 1.57 mm, width 0.90 to 1.12 mm. Form elongate, oval. Color black, antenna, mouthparts, and leg brownish yellow except basal $\frac{3}{4}$ of femur brown. Dorsal pubescence short, semierect, yellowish white. Punctation on head and pronotum fine, pronotal punctures separated by about a diameter; elytral punctures

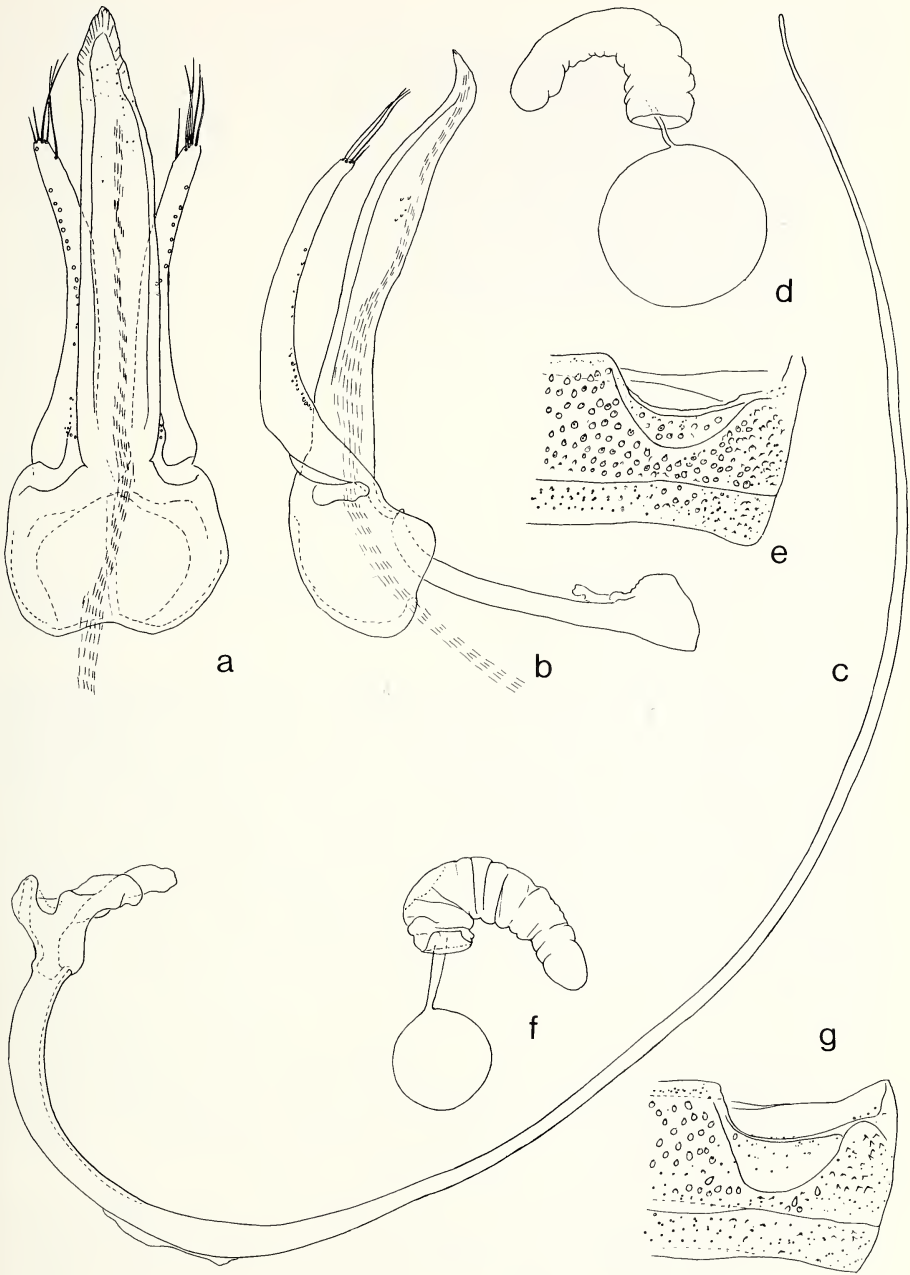


Fig. 53. a-e. *Stethorus punctum punctum*. f, g. *S. p. picipes*

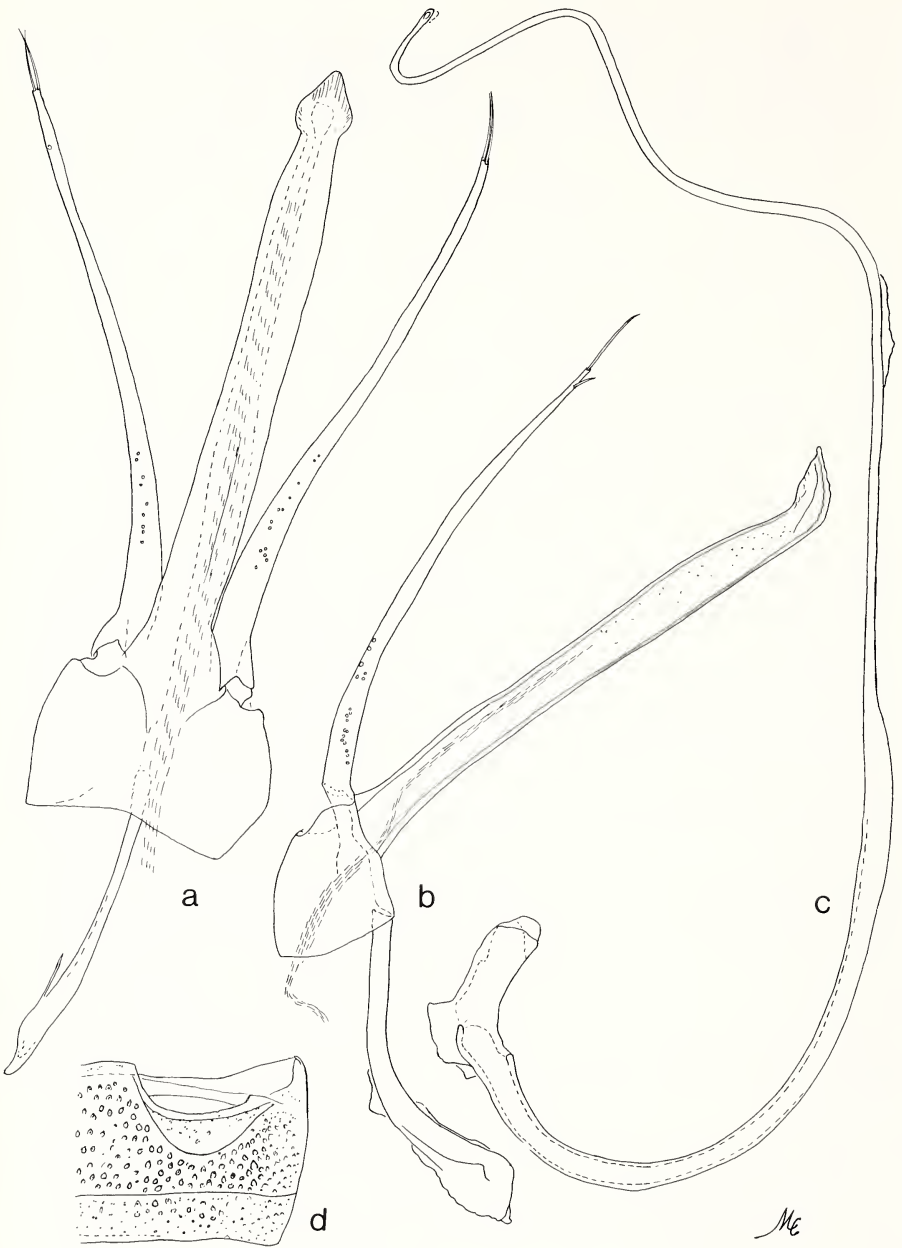


Fig. 54. *Stethorus punctillum*.

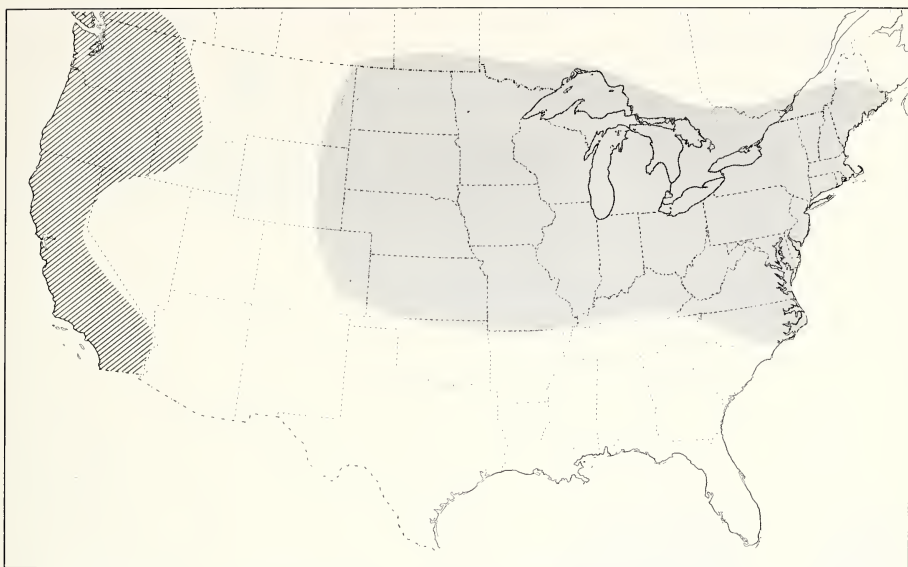


Fig. 55. Distribution. *Stethorus punctum punctum* (shaded, eastern); *S. p. picipes* (shaded, western).

coarse, separated by less than a diameter; abdominal sterna with coarse, dense punctures separated by less than a diameter. Arc of postcoxal line short, not reaching middle of basal abdominal sternum, rounded (Fig. 54d). Male genitalia as in Figure 54a–c. Female genitalia lacking a spermathecal capsule and infundibulum.

Discussion. This species is apparently a European introduction, but not an intentional one. Brown (1950) first reported it from North America (Framingham, Mass.; Vineland Station and Leamington, Ontario) and gave a key to separate *S. punctillum*, *S. punctum*, and *S. picipes*. *Stethorus punctillum* is now known from several North American localities and is often mixed with *S. punctum* in collections. The species has become established on the west coast of the United States, but again it was not intentionally introduced.

Type locality. Not stated.

Type depository. Type not examined.

Distribution. Figure 56. Eastern: southeastern Canada to Massachusetts, west to Michigan and Wisconsin. Western: British Columbia (Vancouver), to Oregon.

Tribe Scymnini

Scymnini Costa 1849, p. 9—Weise, 1895, p. 147—Casey, 1899, p. 133—Mader, 1924, p. 8—Leng, 1920, p. 213—Korschefsky, 1931, p. 110—Wingo, 1952, p. 19—Sasaji, 1968, p. 23—J. Chapin, 1974, p. 18—Belicek, 1976, p. 295.

Scymninae of small size, usually less than 3.0 mm; form oval, rounded, or oblong; dorsal surface and eye pubescent. Antenna 8 to 11 segmented, terminal segments

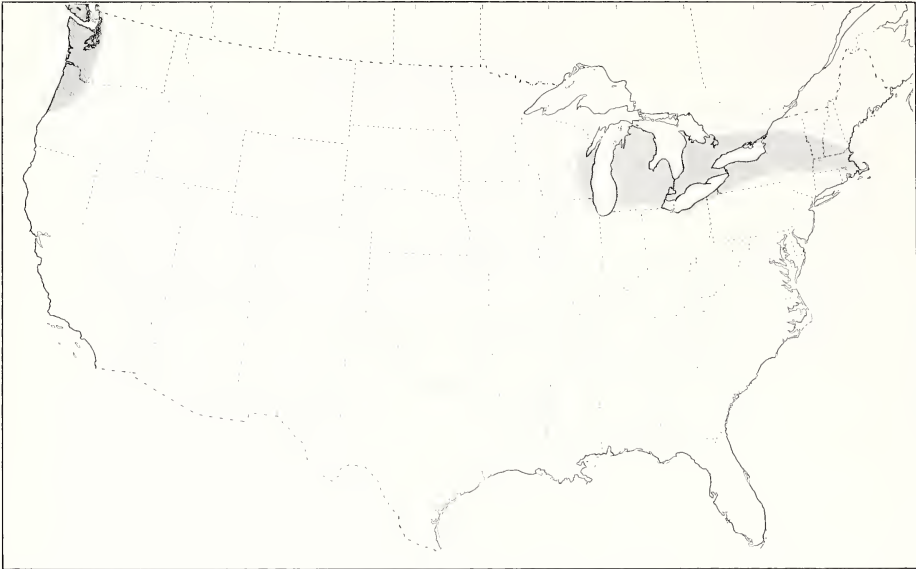


Fig. 56. Distribution. *Stethorus punctillum*.

forming distinct club. Maxillary palpus with apical segment cylindrical or securiform. Leg free, simple, not expanded or enlarged; tarsus trimerous or cryptotetramerous, tarsal claw simple or with basal tooth. Abdomen with 6 visible sterna, sterna usually not fused medially, apex of 6th abdominal sternum of male modified. Male genitalia vary from symmetrical to asymmetrical, form simple (Fig. 93b), or complex (Fig. 190a). Female genitalia with sclerotized infundibulum; genital plate long and narrow, or short, nearly round.

Gordon (1976b) included the genera *Selvadius* and *Blaisdelliana* in this tribe. I now consider *Blaisdelliana* a member of the Hyperaspini and erect the tribe Selvadiini for *Selvadius*. There remain 6 North American genera in the Scymnini: one, *Cryptolaemus*, is introduced; another, *Didion*, is apparently endemic; and the other 4 are worldwide in distribution. Three of these genera (*Scymnus*, *Nephus*, and *Diomus*) have previously been treated by Gordon (1976b); therefore, the descriptions of the species are not included here, but the keys, illustrations, and synonymies are repeated.

KEY TO GENERA OF SCYMNINI

- 1. Head with mouthparts directed postero-ventrad in repose, concealing prosternum; basal antennal segment strongly enlarged (Fig. 57c) *Nephaspis* Casey
- Head with mouthparts not concealing prosternum; basal antennal segment not strongly enlarged 2
- 2(1). Prosternum enlarged, expanded, capable of concealing mouthparts in repose (Fig. 59c) *Cryptolaemus* Mulsant
- Prosternum not enlarged, not concealing mouthparts 3

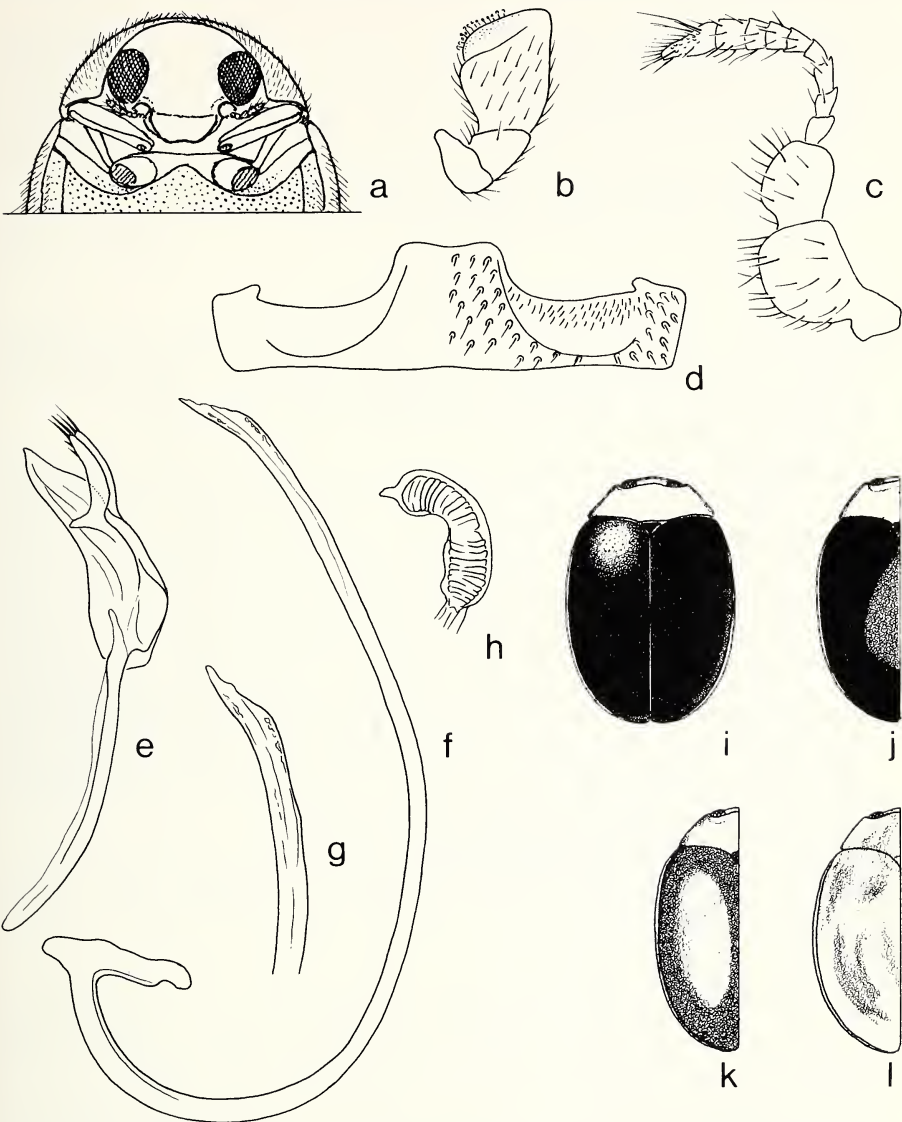


Fig. 57. *Nephaspis oculatus*. a. Venter. b. Maxillary palpus. c. Antenna. d. Postcoxal line. e-g. Male genitalia. h. Spermathecal capsule. i-l. Habitus and variations.

- 3(2). Prosternum with distinct carinae on intercoxal projection, carinae often reaching anterior margin of prosternum (Fig. 68c) 4
- Prosternum without carinae, or at most with short ridges next to coxal cavities (Fig. 229g) 5

- 4(3). Postcoxal line extending downward, joining hind margin of first abdominal sternum (Fig. 257b), apex not recurved *Diomus* Mulsant
- Postcoxal line complete or incomplete, not joining hind margin of first abdominal sternum, apex recurved (Fig. 268e, g) *Scymnus* Kugelann
- 5(3). Postcoxal line complete, recurved to base of first abdominal sternum (Fig. 62e) ..
..... *Didion* Casey
- Postcoxal line extending nearly to lateral margin of first abdominal sternum, either parallel to hind margin (Fig. 229j), or with apex curved forward (Fig. 229h) *Nephus* Mulsant

Genus *Nephaspis* Casey

Nephaspis Casey, 1899, p. 168—Casey, 1905, p. 161—Wingo, 1952, p. 44—Gordon, 1972b, p. 145—J. Chapin, 1974, p. 37—Gordon, 1976b, p. 8. Type-species; *Nephaspis gorhami* Casey, by subsequent designation of Gordon, 1972b.

Nephasis: Korschefsky, 1931, p. 168—Blackwelder, 1945, p. 445 (error).

Scymnini with form elongate, somewhat oval; length less than 1.60 mm. Head with mouthparts directed posteroventrally in repose, concealing prosternum (Fig. 57a); clypeus extending beyond eye, anterolateral angle produced, rounded, anterior margin truncate, lateral margin emarginate at antennal insertion; gena partially dividing eye. Maxillary palpus with apical segment somewhat securiform (Fig. 57b). Antenna with 8-segmented scape, basal 2 segments enlarged, club 3-segmented (Fig. 57c). Pronotum widest at posterolateral angle, narrowed apically. Prosternum short, only slightly longer than anterior coxa, intercoxal process narrow, apex truncate. Metasternum tumid. Front and middle femora slender, not enlarged; hind femur enlarged medially; all tibiae slender; tarsus cryptotetramerous, claw simple, not toothed. Abdomen with 6 visible sterna; postcoxal line as in *Scymnus* (*S. str.*) (Fig. 57d). Male genitalia symmetrical (Fig. 57e–g). Female genitalia with distinctly sclerotized spermathecal capsule, infundibulum absent; genital plate long, slender.

The extremely large basal antennal segment, strongly tumid sternum and posteroventrally directed mouthparts characterize this genus. It is unlike any other Western Hemisphere genus in these respects, being similar only to the Old World genus *Clitostethus*.

The 4 known species are all entirely neotropical except *N. oculatus* which is established in the United States. This species is probably native to Central America and may have entered the West Indies and the United States on imported plant materials. It is well established in Florida, and Wingo (1952) described it as *N. amnicola* from specimens taken in Iowa. All available host data indicate that members of this genus are predators on whiteflies of the family Aleurodidae. Specific host records are: *Aleurodicus dispersus* Russell and *A. cocois* (Curtis). This genus was revised by Gordon (1972b).

Nephaspis oculatus (Blatchley), new combination

Fig. 57e–l; Map, Fig. 58

Scymnus oculatus Blatchley, 1917, p. 140.

Nephaspis amnicola Wingo, 1952, p. 44—Gordon, 1972b, p. 149—J. Chapin, 1974, p. 37. **New Synonymy.**



Fig. 58. Distribution. *Nephaspis oculatus*.

Diagnosis. Length 1.19 to 1.48 mm, width 0.79 to 1.00 mm. Color yellow; elytron usually piceous to black along base and lateral margin, central area yellowish brown, apex narrowly yellow (Fig. 57j); elytron in male is varied from completely black (except apical yellow area) to black or piceous with red or yellow discal spot (Fig. 57i-l). Discal spot small and round, or elongate. Male genitalia as in Figure 57e-g. Female genitalia as in Figure 57h.

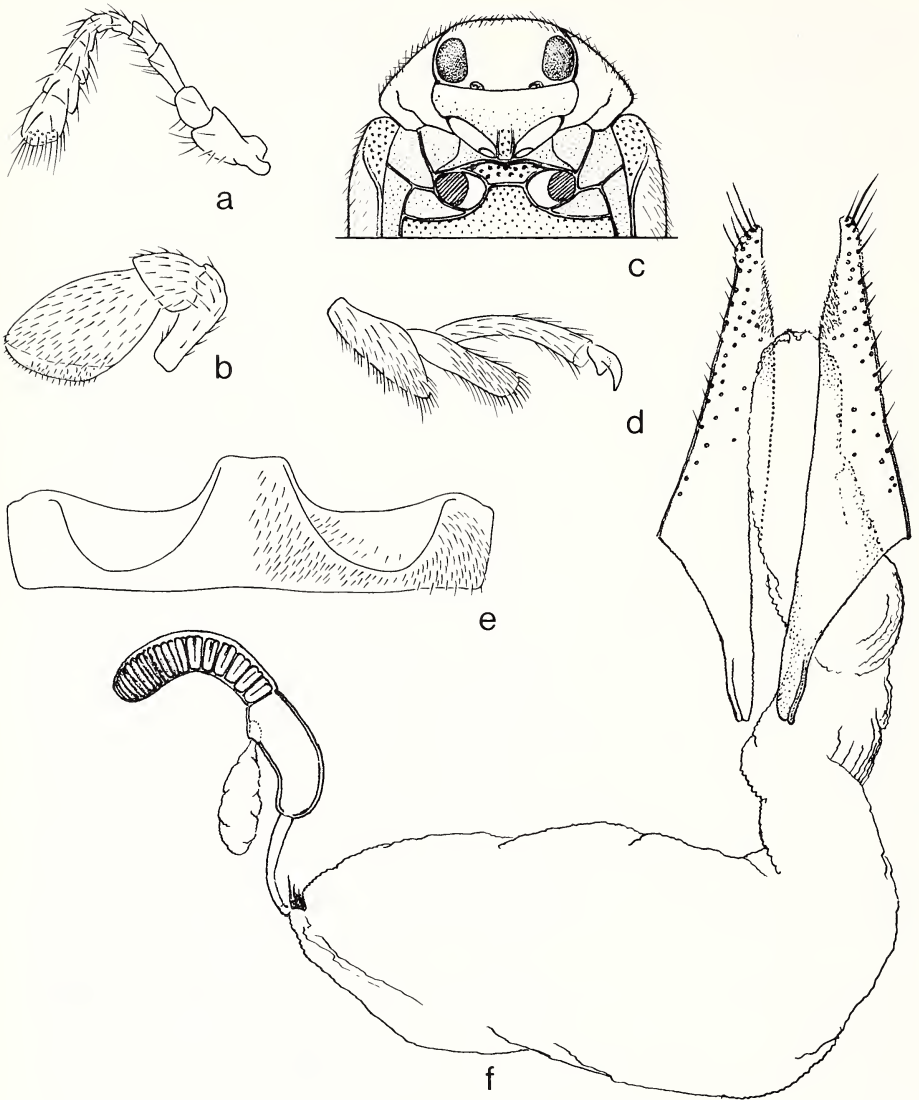


Fig. 59. *Cryptolaemus montrouzieri*. a. Antenna. b. Maxillary palpus. c. Venter. d. Tarsus. e. Postcoxal line. f. Female genitalia.

Discussion. The name *Scymnus oculatus* Blatchley was overlooked during preparation of the revision of the genus *Scymnus* (Gordon, 1976b) and was brought to my attention by Herbert Dozier. Examination of the holotype revealed that *S. oculatus* is the same species later described as *amnicola* Wingo.

Type locality. Of *oculatus*, Dunedin, Florida; of *amnicola*, Iowa, Boone, Ledges State Park.

Type depository. Of *oculatus*, PU; of *amnicola*, USNM.

Distribution. Figure 58. FLORIDA: distributed throughout the state. IOWA: Boone, Ledges State Park. LOUISIANA: Pointe Coupee Parish. NEW HAMPSHIRE: Webster. TEXAS: Cameron Co., La Feria; Weslaco.

Genus *Cryptolaemus* Mulsant

Cryptolaemus Mulsant, 1853, p. 140—Crotch, 1874b, p. 204—Leng, 1920, p. 214—Korschefsky, 1931, p. 169—Wingo, 1952, p. 22—Chapin, 1965, p. 198—J. Chapin, 1974, p. 38. Type-species; *Cryptolaemus montrouzieri* Mulsant, by monotypy.

Scymnini with length more than 3.00 mm; form oval, convex. Antenna with 7-segmented scape, club 3-segmented, loose (Fig. 59a). Maxillary palpus with apical segment securiform (Fig. 59b). Prosternum broadly rounded anteriorly and produced to cover mouthparts and antenna (Fig. 59c); carinae weak, parallel, extending less than halfway to anterior margin of prosternum. Tibial spurs absent; tarsus trimerous; tarsal claw with broad basal tooth equal to half the length of claw (Fig. 59d). Abdomen with postcoxal line complete, as in *Scymnus* (*Pullus*) (Fig. 59e). Male genitalia with basal lobe symmetrical. Female genitalia with strong spermathecal capsule; sperm duct short; infundibulum reduced to a small sclerite at head of bursa; genital plates long, triangular (Fig. 59f).

Cryptolaemus is a small genus of the Indo-Australian region. The only species present in the Western Hemisphere is *C. montrouzieri* which was introduced as a scale predator. The expanded prosternum and large size readily separate *Cryptolaemus* from other genera of New World Scymnini. In my previous key (Gordon, 1976b) to the genera of Scymnini, I inadvertently omitted this genus. Specific host records are as follows: *Chloropulvinaria psidii* (Maskell); *Chrysomphalus pinnulifer* (Maskell); *Coccus viridis* (Green); *Dactylopius confusus* (Cockerell); *Dactylopius opuntiae* (Cockerell); *Dactylopius tomentosus* (Lamarck); *Dysmicoccus boninsis* (Kuwana); *Dysmicoccus brevipes* (Cockerell); *Eriococcus araucariae* (Maskell); *Ferrisia virgata* (Cockerell); *Nipaecoccus aurilanus* (Maskell); *Nipaecoccus filamentosus* (Cockerell); *Nipaecoccus nipae* (Maskell); *Planococcus citri* (Risso); *Planococcus krauhniae* (Kuwana); *Planococcus vitis* (Neidielski); *Pseudococcus calceolariae* (Maskell); *Pseudococcus comstocki* (Kuwana); *Pseudococcus crotonis* (Green); *Pseudococcus hirsutus* (Green); *Pseudococcus longispinus* (Targioni-Tozzetti); *Pseudococcus maritimus* (Ehrhorn); *Pseudococcus obscurus* (Essig); *Pulvinaria icerya* (Guerin); *Pulvinaria psidii* (Maskell); *Rastrococcus iceryoides* (Green); *Saccharicoccus sacchari* (Cockerell); *Trionymus insularis* (Ehrhorn). Ghorpade (1981) recorded *C. montrouzieri* as feeding on *Aphis gossypii* Glover in India.

Cryptolaemus montrouzieri Mulsant

Fig. 60a–e; Map, Fig. 61

Cryptolaemus montrouzieri Mulsant, 1853, p. 140.

Cryptolaemus montrouzieri: Crotch, 1874b, p. 204 (emendation)—Leng, 1920, p. 214—Korschefsky, 1931, p. 169—Wingo, 1952, p. 45—Chapin, 1965, p. 199—J. Chapin, 1974, p. 38.

Diagnosis. Length 3.40 to 4.50 mm, width 2.40 to 3.10 mm. Head, prothorax, tip

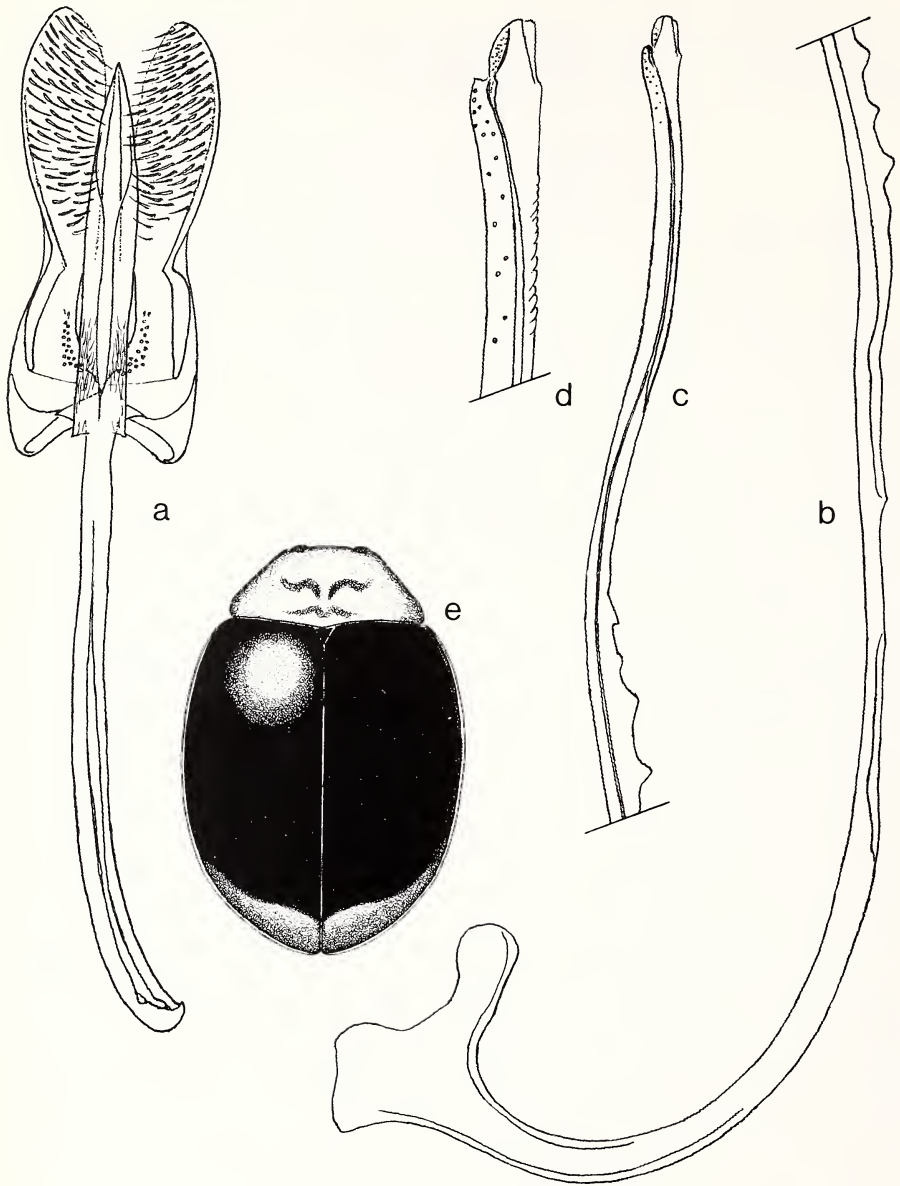


Fig. 60. *Cryptolaemus montrouzieri*.

of elytron and abdomen reddish yellow; mesosternum and metasternum, leg and elytron (except tip) black or blackish (Fig. 60e). Punctuation of head and pronotum dense, elytral punctuation similar except on humeral callus which is shining, almost devoid of punctures. Male genitalia as in Figure 60a-d.

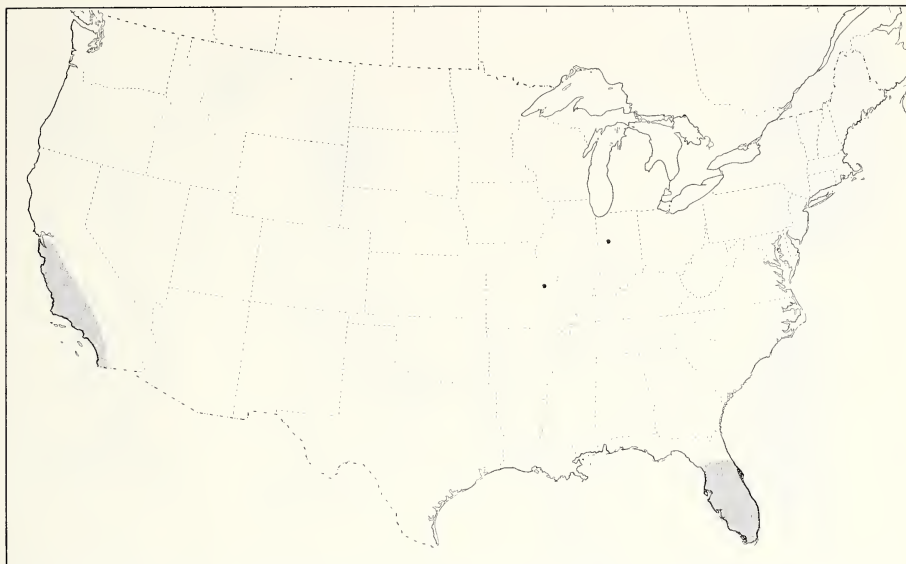


Fig. 61. Distribution. *Cryptolaemus montrouzieri* (shaded, disjunct localities dotted).

Discussion. This species is well established in California and south and central Florida. There are 2 syntypes of *montrouzieri*, one in the UCCC collection, one in the PM collection (R. D. Pope, pers. comm.).

Type locality. "Australia."

Type depository. BMNH.

Distribution. Figure 61. CALIFORNIA: San Francisco to San Diego. FLORIDA: Clearwater. INDIANA: Lafayette (from Wingo, 1952). MISSOURI: Washington (from Wingo, 1952).

Genus *Didion* Casey

Didion Casey, 1899, p. 137—Leng, 1920, p. 213—Korschefsky, 1931, p. 111—Gordon, 1976b, p. 8—Belicek, 1976, p. 299. Type-species; *Didion longulum* Casey, by subsequent designation of Korschefsky, 1931.

Scymnini with form elongate, oval; length less than 2.00 mm. Head short, eye partially concealed by pronotum. Pronotum with lateral margin strongly convergent apically (except *D. nanum*), base of pronotum distinctly narrower than base of elytra (Fig. 63e). Antenna with scape 7-segmented, club 3 segmented, club segments uneven on lower margin (Fig. 62a). Maxillary palpus with apical segment cylindrical, apex oblique (Fig. 62b). Apex of prosternum truncate; intercoxal process flat, with a short carina next to each coxa (Fig. 62c). Tarsus cryptotetramerous; tarsal claw with strong basal tooth (Fig. 62d). Abdomen with postcoxal line on basal sternum complete, as in (*Pullus*) (Fig. 62e). Male genitalia with basal lobe somewhat triangular in ventral view, shorter than paramere; paramere broad, apex rounded; trapes longer than

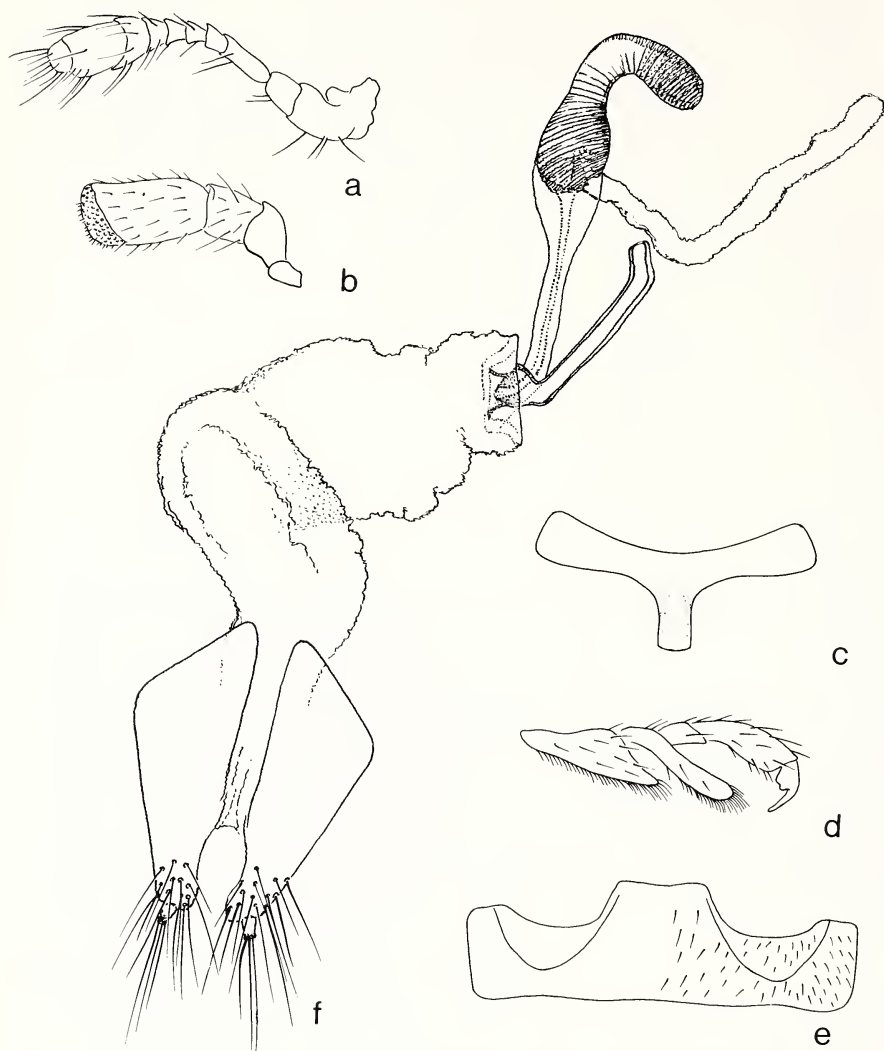


Fig. 62. *Didion* sp. a. Antenna. b. Maxillary palpus. c. Prosternum. d. Tarsus. e. Postcoxal line. f. Female genitalia.

phallobase (Fig. 63a). Female genitalia with spermathecal capsule bent near apex; accessory gland present; sperm duct short, inserted at base of infundibulum; infundibulum long, slender; coxal plate long, slender, with apical stylus (Figure 62f).

Didion is apparently restricted to North America and is represented by 3 species. No concrete information is available on host preferences of members of this genus, but Wingo (1952) thought *D. punctatum* might be feeding on the two-spotted spider mite. Belicek (1976) listed *D. longulum* as being on plants infested with spider mites.

Species of *Didion* are most likely to be confused with members of the genus

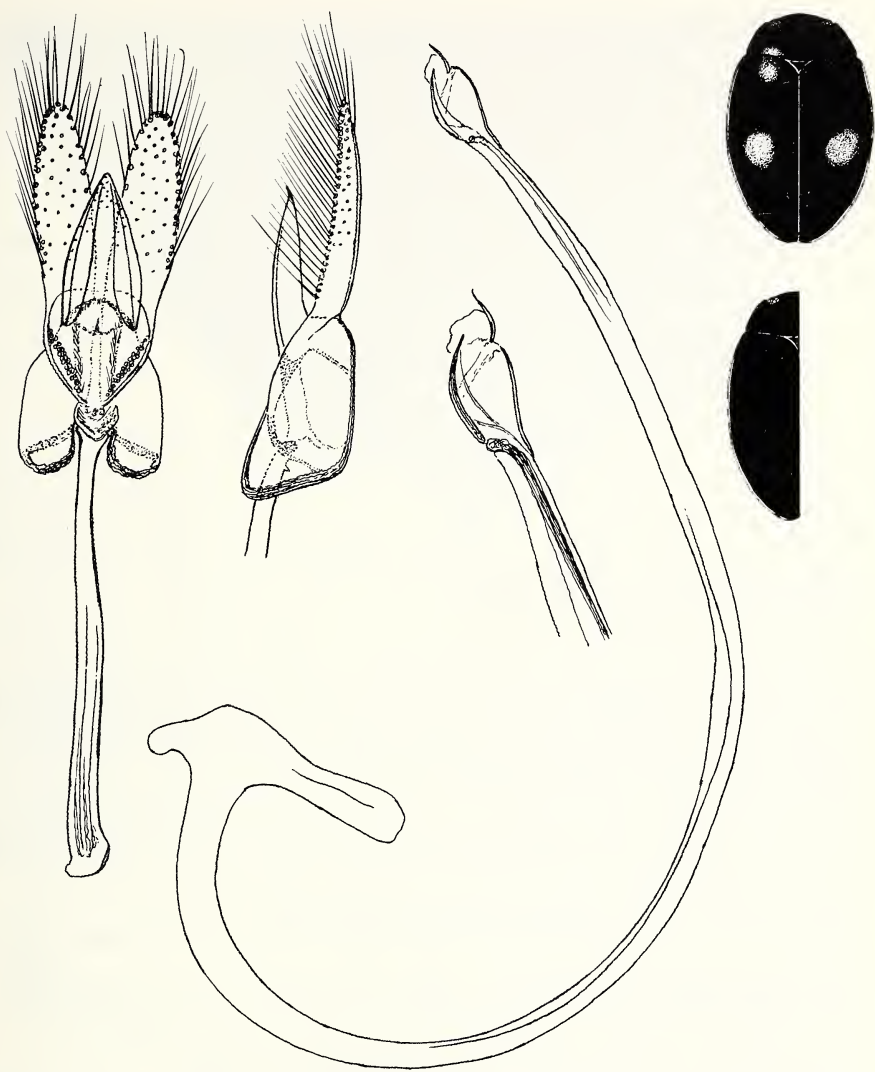


Fig. 63. *Didion punctatum*.

Scymnus, subgenus *Pullus*, but *Didion* lacks complete prosternal carinae, has 10-segmented antennae, usually has the lateral pronotal margin nearly straight and strongly convergent anteriorly, and has the pronotal base distinctly narrower than the elytral base.

KEY TO SPECIES OF *Didion*

- 1. Elytron black with reddish orange discal spot (Fig. 63e) *punctatum* (Melsheimer)
- Elytron immaculate 2

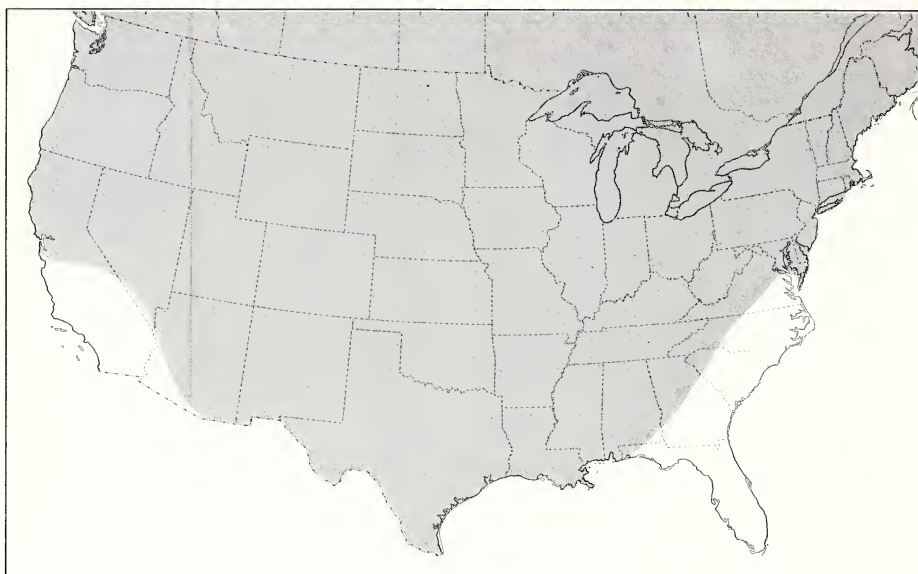


Fig. 64. Distribution. *Didion punctatum*.

- 2(1). Lateral margin of pronotum arcuate (fig. 67f); abdomen densely, coarsely punctured *nanum* (LeConte)
 – Lateral margin of pronotum nearly straight, margins convergent apically (Fig. 63e); abdomen not densely, coarsely punctured 3
 3(2). Punctures on elytron large, deep, distinct; form extremely elongate, narrow (fig. 63e) *punctatum* (Melsheimer)
 – Punctures on elytron small, shallow, indistinct; form oval *longulum* Casey

Didion punctatum (Melsheimer)

Fig. 63a–f, Map, Fig. 64

Scymnus punctatus Melsheimer, 1847, p. 80—Horn, 1895, p. 107—Casey, 1899, p. 152—Leng, 1920, p. 214—Wingo, 1952, p. 27.

Scymnus (Pullus) punctatus: Korschefsky, 1931, p. 164—Wingo, 1952, p. 27.

Didion punctatum: Gordon, 1976b, p. 49—Belicek, 1976, p. 300.

Diagnosis. Length 1.45 to 1.80 mm, width 0.90 to 1.25 mm. Form extremely elongate, slender. Dorsal surface black or dark brown with anterior pronotal angle pale; disc of elytron usually with reddish-orange spot (Figs. 63e, f), occasionally immaculate. Elytral punctures large, deep, distinct. Male genitalia as in Figure 63a–d. Female genitalia as in Figure 62f.

Discussion. There are 8 specimens in the type series, all mounted in pairs on 4 points on the same pin bearing the labels “Melsh, punctatus/(a ragged piece of red paper).” The top specimen nearest the tip of the point is here designated and labeled as the lectotype, and the remaining 7 specimens as paralectotypes.

Type locality. "Pennsylvania" (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 64. Quebec to Alabama, west to British Columbia and California.

Didion longulum Casey

Fig. 65a-e; Map, Fig. 66

Didion longulum Casey, 1899, p. 137—Leng, 1920, p. 213—Korschefsky, 1931, p. 111—Belicek, 1976, p. 299.

Didion parviceps Casey, 1899, p. 137—Leng, 1920, p. 213—Korschefsky, 1931, p. 111. **New Synonymy.**

Scymnus (Pullus) occiduus Casey, 1899, p. 153—Korschefsky, 1931, p. 163. **New Synonymy.**

Diagnosis. Length 1.38 to 1.75 mm, width 0.95 to 1.20 mm. Form elongate, oval. Dorsal surface black or piceous. Pronotum with surface alutaceous, punctures nearly invisible except some northern specimens with fine but distinct punctures. Elytral punctures fine, shallow. Abdominal sterna feebly punctured, mostly smooth. Male genitalia as in Figure 65a-d. Female genitalia as in Figure 65e.

Discussion. This species and *D. nanum* are similar, but *D. nanum* has distinct, coarse punctures on the pronotum and the surface between punctures is shiny. The siphonal apices are also different in the 2 species (Figs. 65c, 67c).

In my revision of the subgenus *Pullus* (Gordon, 1976b), I had intended to point out that *Scymnus (Pullus) occiduus* Casey belonged in the genus *Didion*, but failed to do so. Therefore I now so indicate and also place *occiduus* as a junior synonym of *longulum*. There are 2 types of *occiduus* (male and female) in the Casey collection, I designate and label the female as the lectotype and the male as a paralectotype. The types of *D. longulum* and *D. parviceps* are unique females (holotypes). I cannot separate *D. parviceps* from *D. longulum* and consider them synonymous.

Type locality. Of *longulum*, California, Sonoma Co., Duncans Mills; of *parviceps*, California, Sonoma Co.; of *occiduus*, Nevada, Reno (lectotype here designated).

Type depository. Of *longulum* (35247), *parviceps* (35248), and *occiduus*, (35249), USNM.

Distribution. Figure 66. Alberta to British Columbia, south to California.

Didion nanum (LeConte)

Fig. 67a-f; Map, Fig. 66

Scymnus nanus LeConte, 1852, p. 141—Crotch, 1874b, p. 269—Horn, 1895, p. 107—Wingo, 1952, p. 28.

Scymnus (Pullus) nanus: Casey, 1899, p. 153—Korschefsky, 1931, p. 163—Wingo, 1952, p. 28.

Didion nanum: Gordon, 1976b, p. 49—Belicek, 1976, p. 300.

Diagnosis. Length 1.50 to 1.80 mm, width 1.15 to 1.40 mm. Form elongate, oval (Fig. 67f). Color black; anterolateral angle of pronotum, mouthparts and leg dark reddish brown. Punctuation on head fine, punctures separated by a diameter or less.

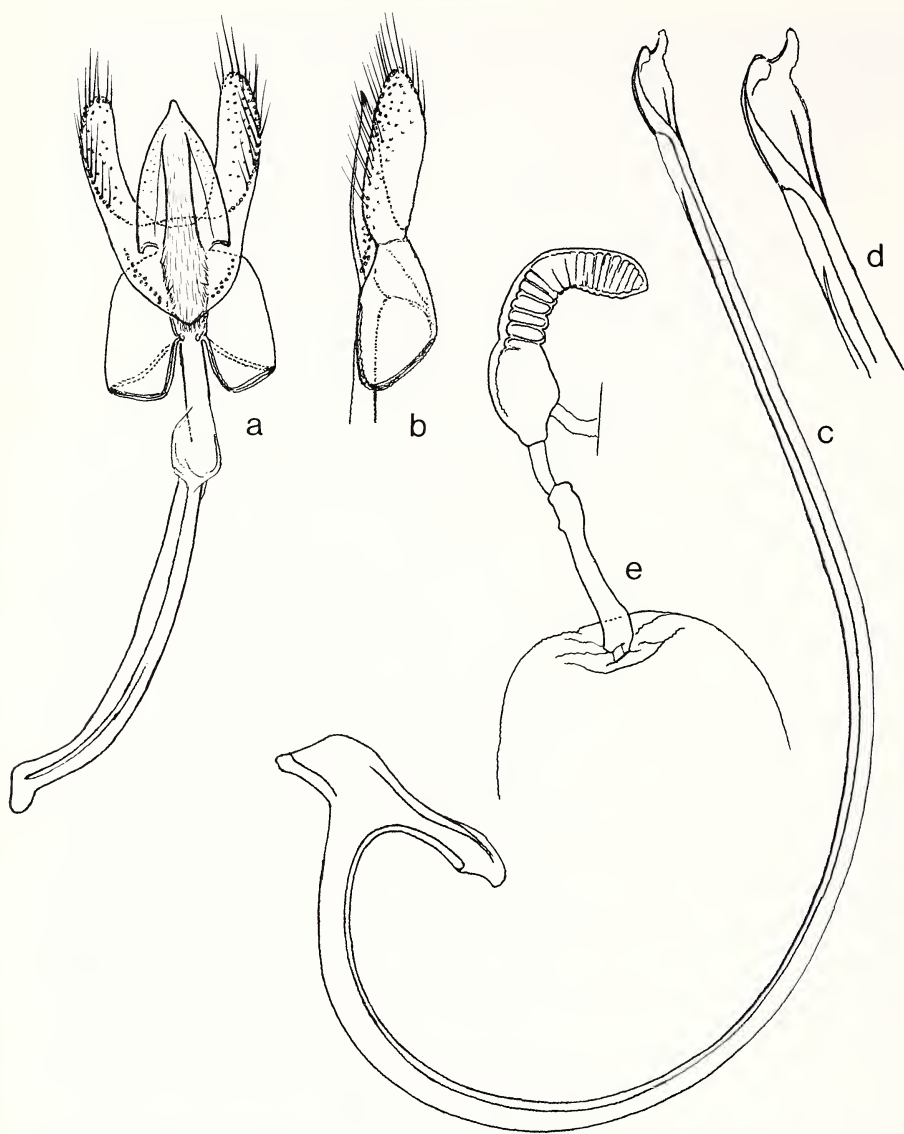


Fig. 65. *Didion longulum*.

Pronotum with punctures equal in size to those on head, separated by less than to twice a diameter; lateral margins not convergent anteriorly, rounded in apical $\frac{1}{4}$. Elytron smooth, shiny, punctures coarser than on pronotum, separated by a diameter or less; pubescence grayish white, arranged in S-curve. Postcoxal line nearly reaching hind margin of first sternum. All abdominal sterna coarsely, densely punctured; 5th

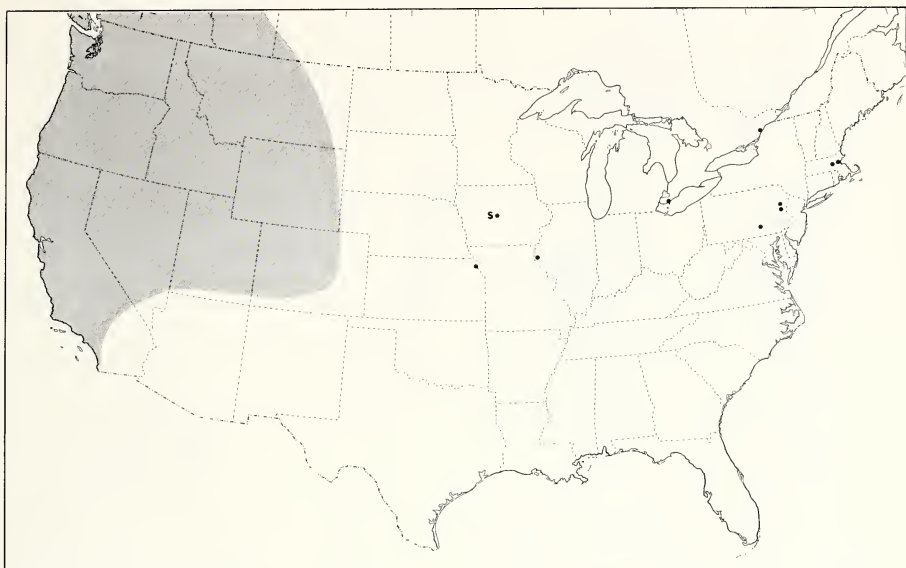


Fig. 66. Distribution. *Didion longulum* (shaded); *D. nanum* (dot).

sternum feebly emarginate apically; 6th sternum broadly, deeply emarginate. Male genitalia as in Figure 67a-d. Female genitalia as in Figure 67e.

Discussion. This species has often been identified as *Scymnus (Pullus) tenebrosus* in collections. The form is broader than in other species of *Didion*, the pronotal margins are not convergent anteriorly, and all abdominal sterna are coarsely, densely punctured. *Didion nanum* resembles a typical *Pullus* in fascies more than it does other species of *Didion*.

LeConte (1852) stated that he had 2 specimens of *nanus*. There are 2 specimens now in his collection. The first of these, a female labeled "(pale green disc)/4698/Type 6747(red paper)" is here designated and labeled the lectotype. The second specimen, a male, bears a pale blue disc which denotes a Lake Superior locality; thus I do not consider this specimen to be a type.

Type locality. "Missouri Territory" (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 66. IOWA: state record. ILLINOIS: Quincy. KANSAS: Atchison. MASSACHUSETTS: Berlin; Boston. ONTARIO: Brockville; Pt. Pelee; Prince Edward Co. PENNSYLVANIA: Dauphin Co., Harrisburg; Monroe Co., Canadensis; Wind Gap.

Genus *Scymnus* Kugelann

Scymnus Kugelann, 1794, p. 545.—Mulsant, 1846, p. 219.—Mulsant, 1850, p. 948.—Mulsant 1853, p. 152.—Costa, 1849, p. 82.—LeConte, 1852, p. 130.—Crotch, 1874b, p. 239.—Chapuis, 1876, p. 211.—Weise, 1885a, p. 6, 67.—Horn 1895, p.

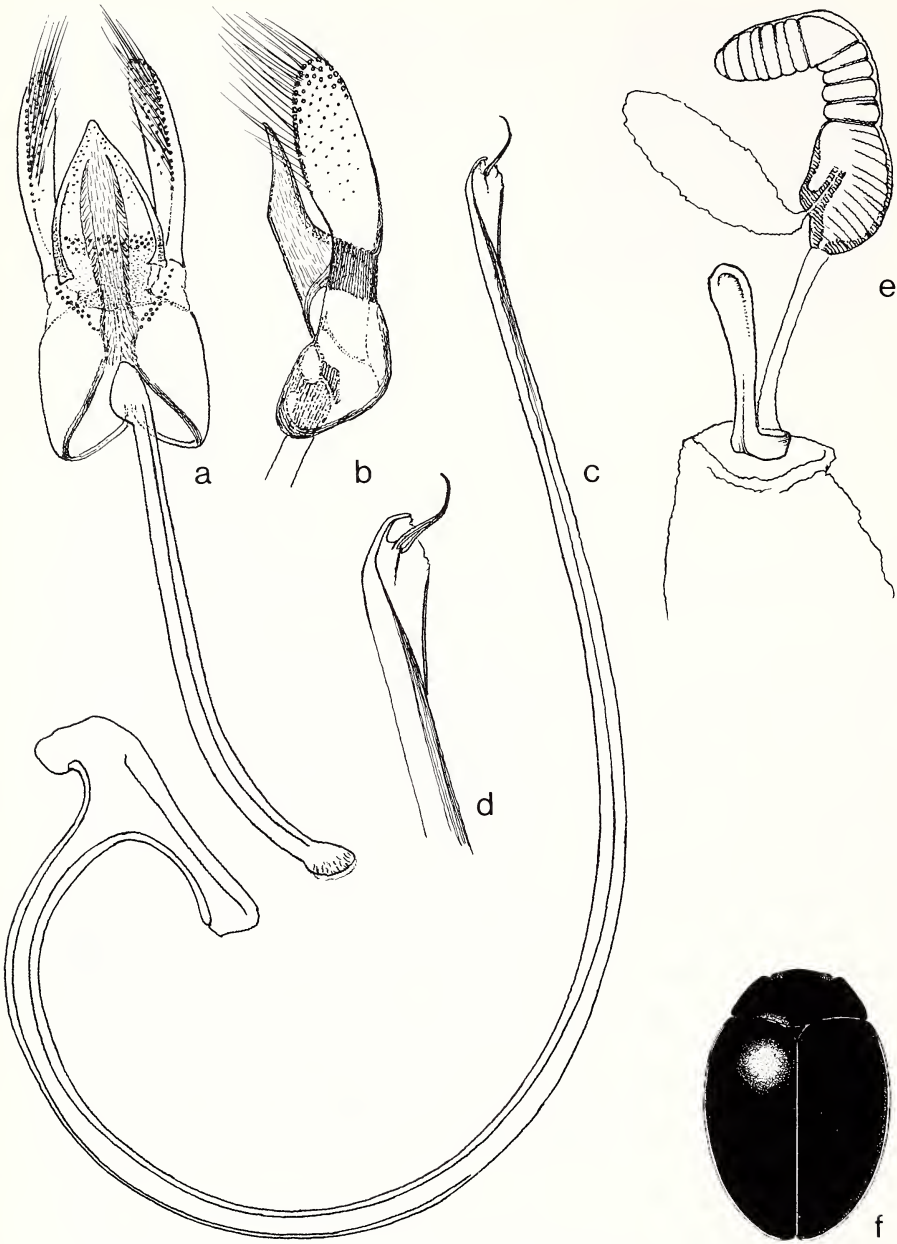


Fig. 67. *Didion nanum*.

83.—Casey, 1899, p. 134.—Mader 1924, p. 8.—Korschefsky, 1931, p. 115.—Wingo, 1952, p. 19.—Mader 1955, p. 869.—Fursch, 1958, p. 77.—Bielawski, 1959, p. 36.—Arnett, 1963, p. 809.—Chapin, 1965, p. 202.—J. Chapin, 1974, p. 18.—Gordon, 1976b, p. 10. Type-species; *Scymnus nigrinus* Kugelann, by subsequent designation of Korschefsky, 1931.

Scymnini with form varying from rounded to elongate, oval, widest at middle of elytra unless otherwise stated. Antenna 10 or 11-segmented, club of 4 or 5 segments, lower margin of club segments uneven (Fig. 68a, b). Apical segment of maxillary palpus cylindrical, apex obliquely truncate. Anterior margin of clypeus truncate or slightly convex, clypeus extending slightly beyond eye, a narrow, short projection extending onto eye at antennal insertion. Tarsus with 4 segments, tarsal claw of male with inner claw larger than in female. Prosternum with distinct carinae (Fig. 68c). Postcoxal line recurved toward base of first abdominal sternum, complete or incomplete. Female genitalia with sclerotized infundibulum; genital plate long, narrowly triangular (Fig. 68d).

The genus *Scymnus* was revised by Gordon (1976b); therefore, only additional locality records and some necessary corrections in synonymy are included for each species herein, except for one introduced species not included in 1976b, *Scymnus (P.) suturalis* Thunberg.

KEY TO SUBGENERA OF *Scymnus*

1. Postcoxal line incomplete, apical end recurved, directed toward base of first sternum (Fig. 68e) *Scymnus* Kugelann
- Postcoxal line complete, recurved, extending to base of first sternum (Fig. 68g) *Pullus* Mulsant

Subgenus *Scymnus* Kugelann

Scymnus Kugelann, 1794, p. 545.—Mulsant, 1846, p. 219.—Mulsant, 1850, p. 965.—Casey, 1899, p. 138.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 115.—Wingo, 1952, p. 27.—Mader, 1955, p. 929.—Fursch, 1958, p. 79.—Bielawski, 1959, p. 44.—Kamiya, 1961, p. 291.—Hatch, 1961, p. 151.—J. Chapin, 1974, p. 19.—Gordon, 1976b, p. 10.—Belicek, 1976, p. 300. Type-species; *Scymnus nigrinus* Kugelann, by subsequent designation of Korschefsky, 1931.

Antenna 10 or 11-segmented (Fig. 68a, b); apical segment of maxillary palpus cylindrical, obliquely truncate apically. Prosternum with 2 strong carinae nearly always reaching anterior margin. Postcoxal line incomplete, curved forward apically (Fig. 68e, f); male 5th and 6th abdominal sterna truncate or emarginate apically. Female with distinct infundibulum (Fig. 69e).

KEY TO SPECIES OF *Scymnus* (*Scymnus*)

1. Species with elytron entirely pale or mostly pale with some dark areas, if mostly dark then pale areas not restricted to apical third nor forming distinct median spot on elytron 2
- Species with elytron black or black with distinct, pale, median or apical spot .. 3

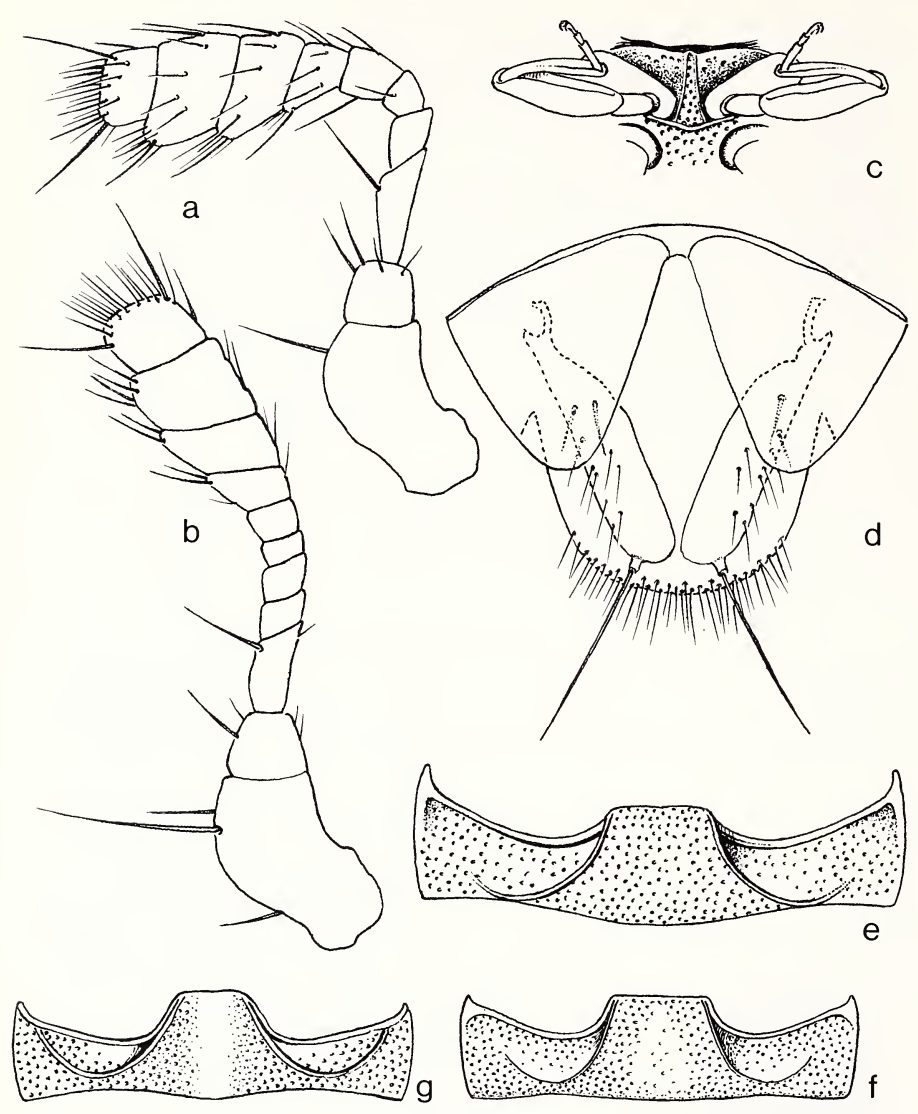


Fig. 68. *Scymnus* sp. a, b. Antennae. c. Prosternum. d. Genital plates. e-g. Postcoxal lines.

- 2(1). Form evenly tapered at both ends; average length less than 2.0 mm; elytron never with distinct, irregular, dark spots *difficilis* Casey
- Form broad in apical third, pronotum and elytron noticeably discontinuous; average length more than 2.0 mm.; elytron with distinct, irregular, dark spots at least on California specimens *nebulosus* LeConte
- 3(1). Elytron black with pale antero-median spot *circumspectus* Horn
- Elytron black without pale antero-median spot 4

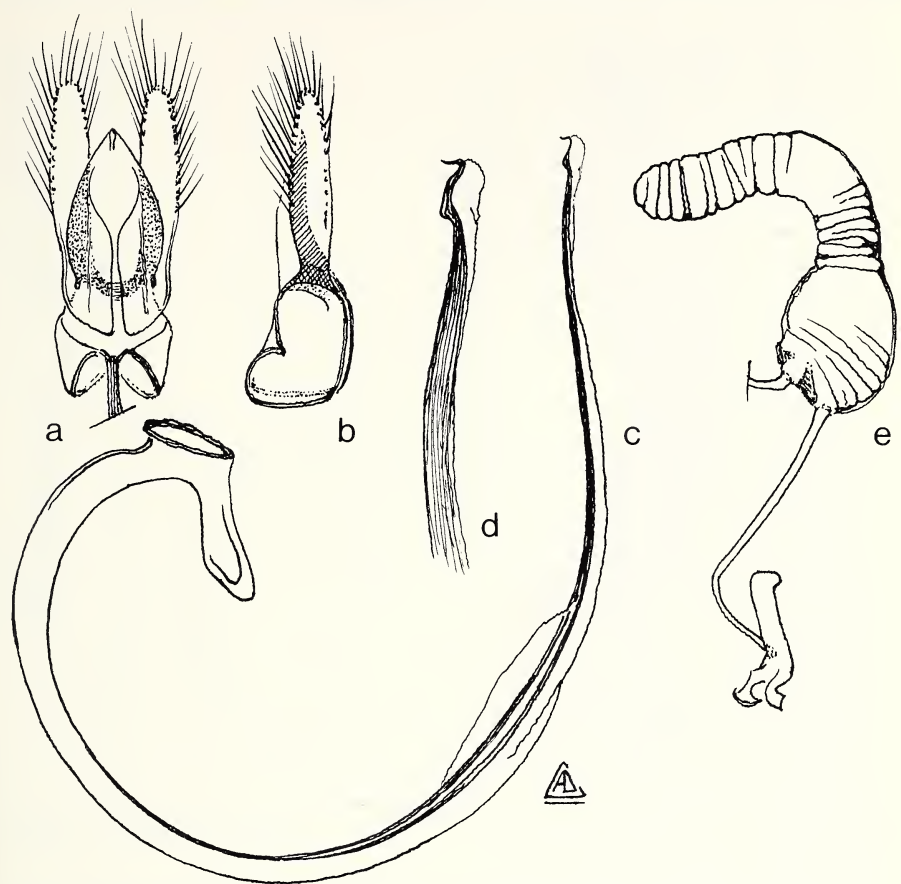


Fig. 69. *Scymnus* (*S.*) *nebulosus*.

4(3).	Postcoxal line distinctly separated from hind margin of first abdominal sternum (Fig. 68f)	5
-	Postcoxal line reaching hind margin of first abdominal sternum or approaching it closely (Fig. 68e)	7
5(4).	Species known only from east of the Mississippi River; postcoxal line approaching hind margin of first sternum	<i>indianensis</i> Weise
-	Species known only from west of the Mississippi River; postcoxal line not approaching hind margin of first sternum	6
6(5).	Apex of elytron with pale area forming a spot occupying apical 1/4 or more ...	<i>coosi</i> Hatch
-	Apex of elytron not or very feebly pale	<i>fenderi</i> Malkin
7(4).	Apical 1/3 or more of elytron yellowish red; pronotum alutaceous	<i>opaculus</i> Horn
-	Apex of elytron black or with narrow, pale yellow border; pronotum not alutaceous (except <i>caurinus</i>)	8



Fig. 70. Distribution. *Scymnus* (*S.*) *nebulosus*.

- 8(7). Pronotum alutaceous with punctures finer than on head; distribution mostly west of Rocky Mountains *caurinus* Horn
- Pronotum not alutaceous, punctures usually larger than on head; distribution mostly east of Rocky Mountains 9
- 9(8). Form extremely elongate, nearly parallel sided; known only from west of the Mississippi River 10
- Form rounded, not parallel sided; known from both east and west of the Mississippi River 11
- 10(9). Surface of elytron smooth, punctures distinctly coarser than on pronotum *apicanus pseudapicanus*, new name
- Surface of elytron distinctly micro-reticulate, punctures not or barely larger than on pronotum *paracanus linearis* Gordon

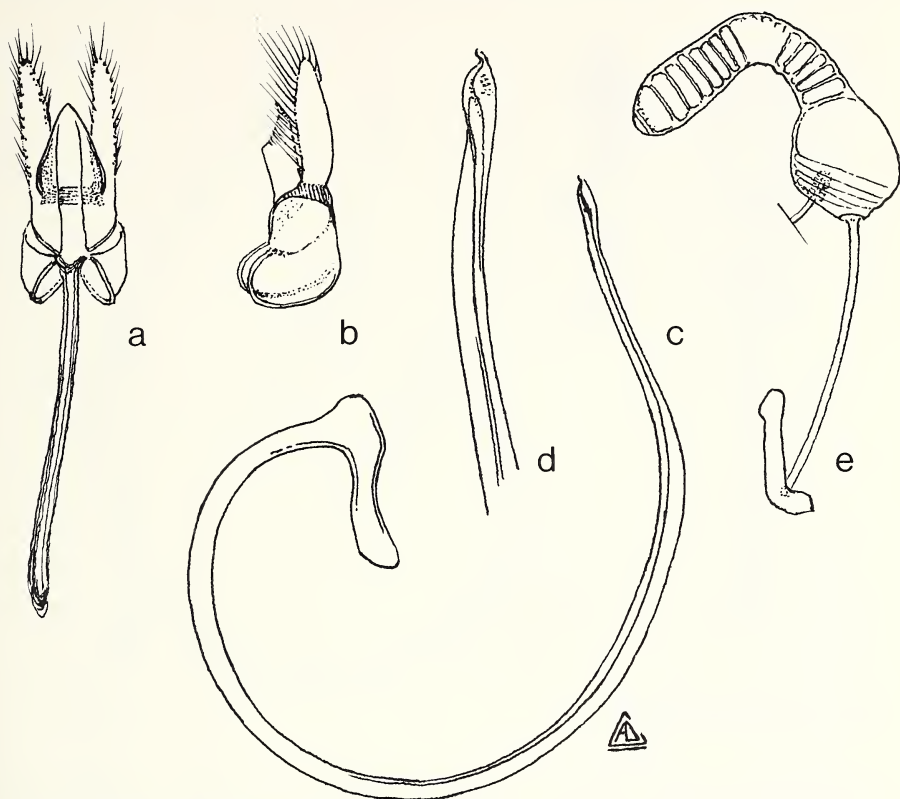


Fig. 71. *Scymnus (S.) difficilis*.

- 11(9). Basal lobe of male genitalia emarginate ventrally in lateral view (Fig. 82b); female infundibulum slender, tapered at spermathecal end (Fig. 82e) . . . *americanus* Mulsant
 – Male and female genitalia not as described above 12
- 12(11). Paramere of male genitalia short, strongly tapered from base to apex (Fig. 87b); female infundibulum slender, sinuate toward spermathecal end (Fig. 87e)
 *paracanus paracanus* J. Chapin
 – Paramere of male genitalia elongate, not tapered toward apex (Fig. 84b); female infundibulum short, broad at spermathecal end (Fig. 84e)
 *apicanus apicanus* J. Chapin

Scymnus (Scymnus) nebulosus LeConte

Fig. 69a–c; Map, Fig. 70

Scymnus nebulosus LeConte, 1852, p. 137.—Crotch, 1874b, p. 262.—Horn, 1895, p. 95.—Steinweden, 1929, p. 29.

Scymnus (Scymnus) nebulosus: Casey, 1899, p. 154.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 163.—J. Chapin, 1974, p. 22.—Gordon, 1976b, p. 13.

Scymnus infuscatus Boheman, 1859, p. 208.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 160.—Gordon, 1976b, p. 15.

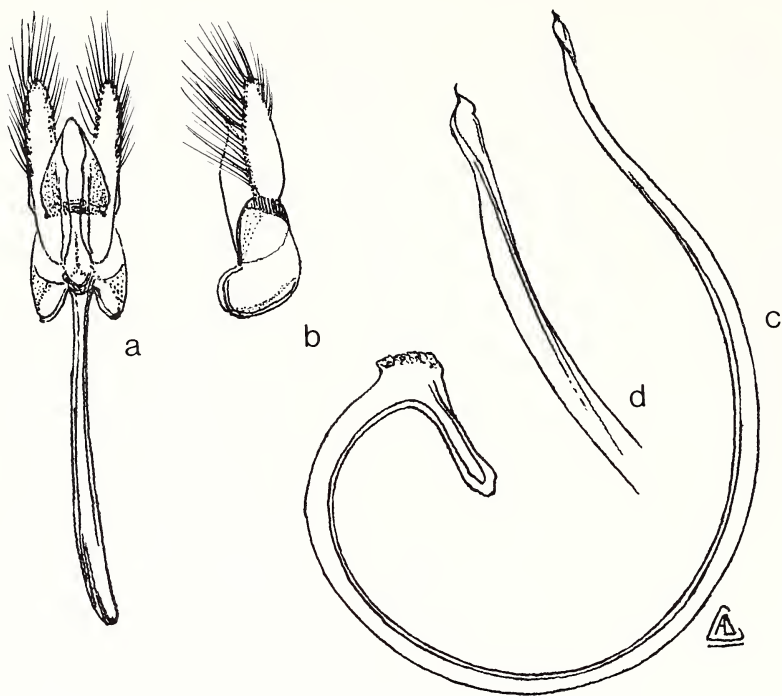


Fig. 72. *Scymnus (S.) coosi*.

Scymnus phelpsii Crotch, 1874a, p. 77.—Horn, 1895, p. 96.—Gordon, 1976b, p. 15.
Scymnus (Scymnus) phelpsii: Casey, 1899, p. 1954.—Leng, 1920, p. 214.—Kor-
 schefsky, 1931, p. 165.—Malkin, 1943b, p. 194.—Hatch, 1961, p. 153.—Gordon,
 1976b, p. 15.—Belicek, 1976, p. 302.

Scymnus (Scymnus) harneyi Hatch, 1961, p. 152.—Gordon, 1976b, p. 15.

For detailed description, and discussion see Gordon, 1976b, p. 13.

Scymnus (Scymnus) difficilis Casey

Fig. 71a-e; Map, Fig. 73

Scymnus (Scymnus) difficilis Casey, 1899, p. 154.—Leng, 1920, p. 214.—Kor-
 schefsky, 1931, p. 157.—Gordon, 1976b, p. 19.

For detailed description, and discussion see Gordon, 1976b, p. 19.

Scymnus (Scymnus) coosi Hatch

Fig. 72a-d; Map, Fig. 73

Scymnus (Scymnus) coosi Hatch, 1961, p. 152.—Gordon, 1976b, p. 20.

For detailed description, and discussion see Gordon, 1976b, p. 20.



Fig. 73. Distribution. *Scymnus* (*S.*) *difficilis* (dot); *S.* (*S.*) *coosi* (star).

Scymnus (*Scymnus*) *fenderi* Malkin

Fig. 74a–e; Map, Fig. 75

Scymnus (*Scymnus*) *fenderi* Malkin, 1943a, p. 109.—Gordon, 1976b, p. 23.

For detailed description, and discussion see Gordon, 1976b, p. 23.

Scymnus (*Scymnus*) *caurinus* Horn

Fig. 76a–e; Map, Fig. 77

Scymnus caurinus Horn, 1895, p. 97.

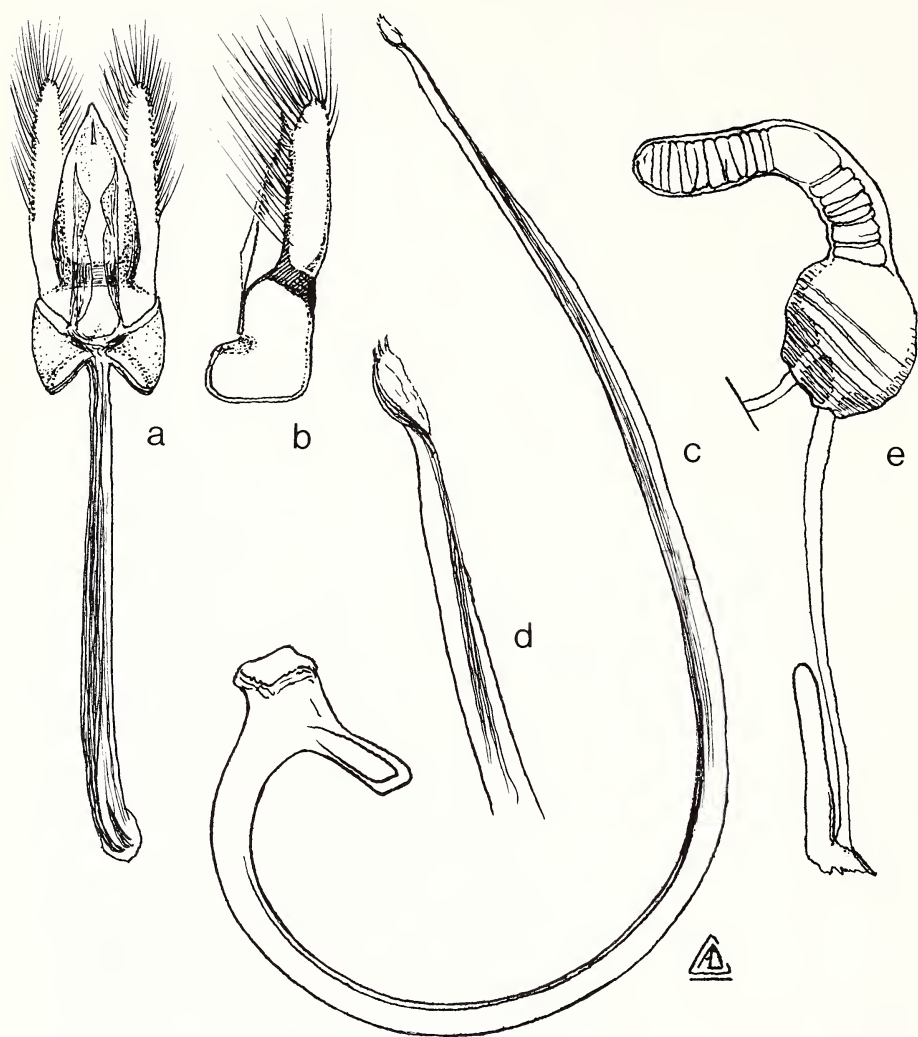


Fig. 74. *Scymnus* (*S.*) *fenderi*.

Scymnus (*Scymnus*) *caurinus*: Casey, 1899, p. 154.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 156.—Malkin, 1943b, p. 194.—Hatch, 1961, p. 151.—Belicek, 1976, p. 303.—Gordon, 1976b, p. 26.

Scymnus (*Scymnus*) *aluticollis* Casey, 1899, p. 154.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 153.—Gordon, 1976b, p. 26.

For detailed description, and discussion see Gordon, 1976b, p. 26.

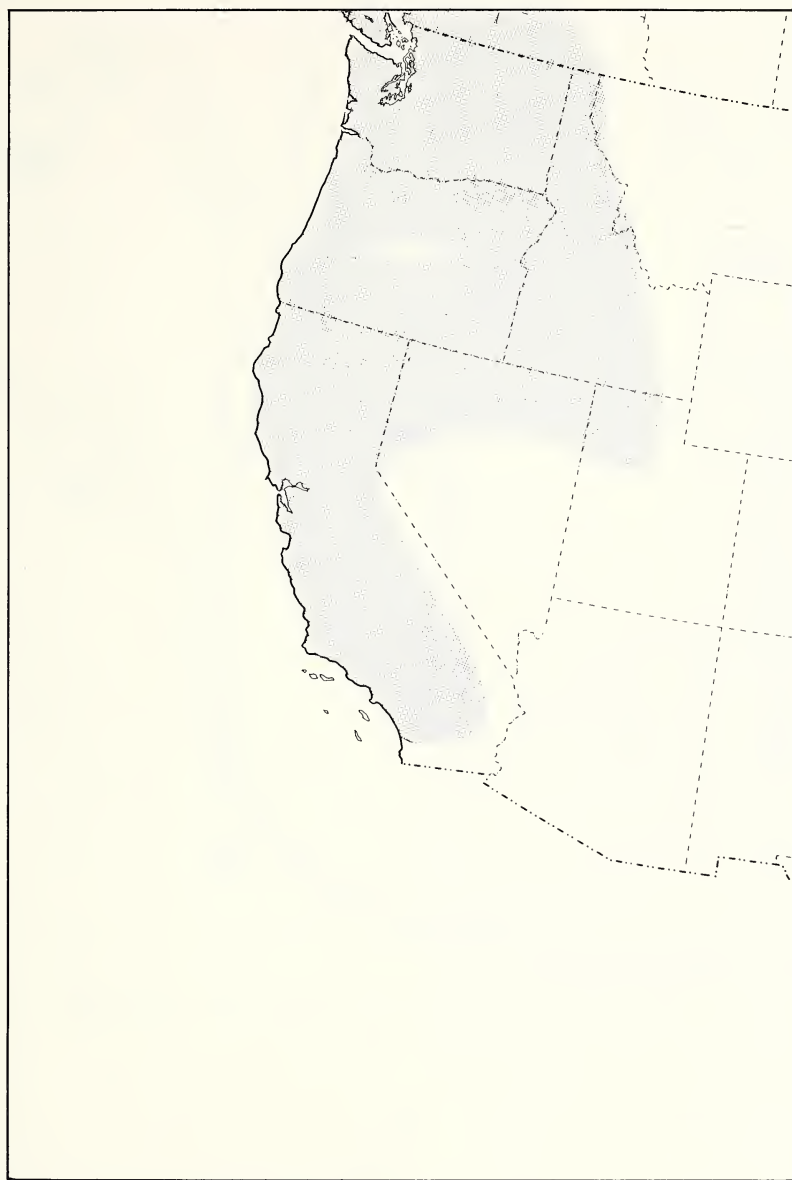


Fig. 75. Distribution. *Scymnus (S.) fenderi*.

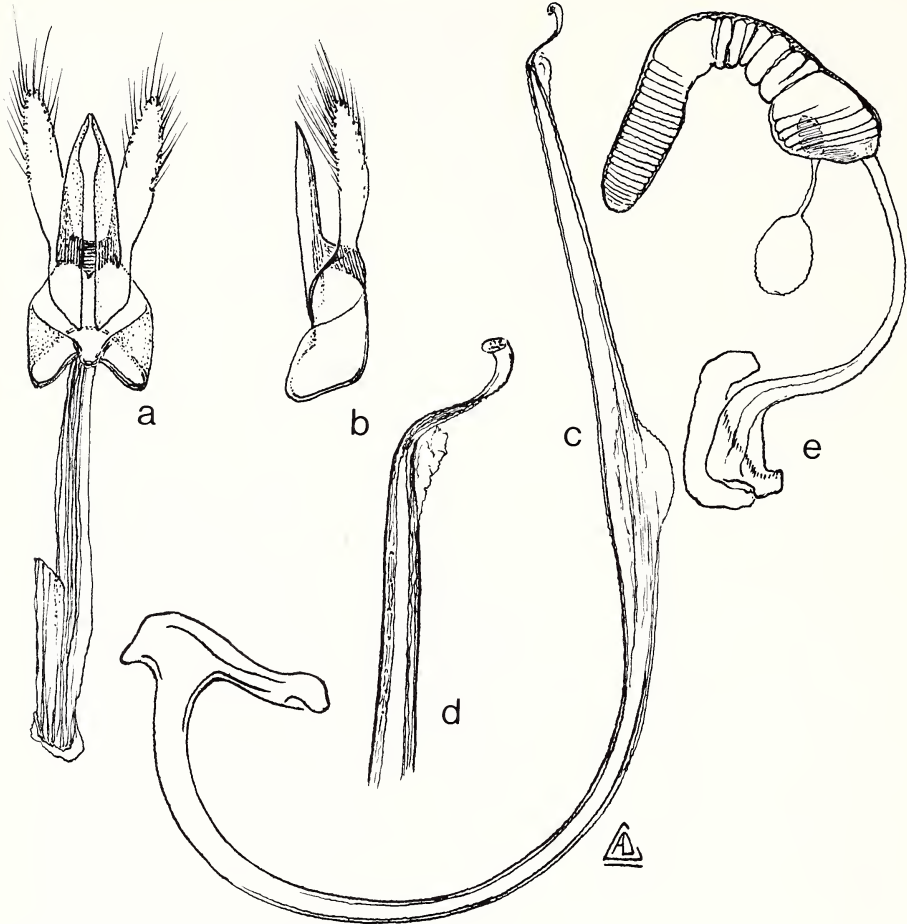


Fig. 76. *Scymnus* (S.) *caurinus*.

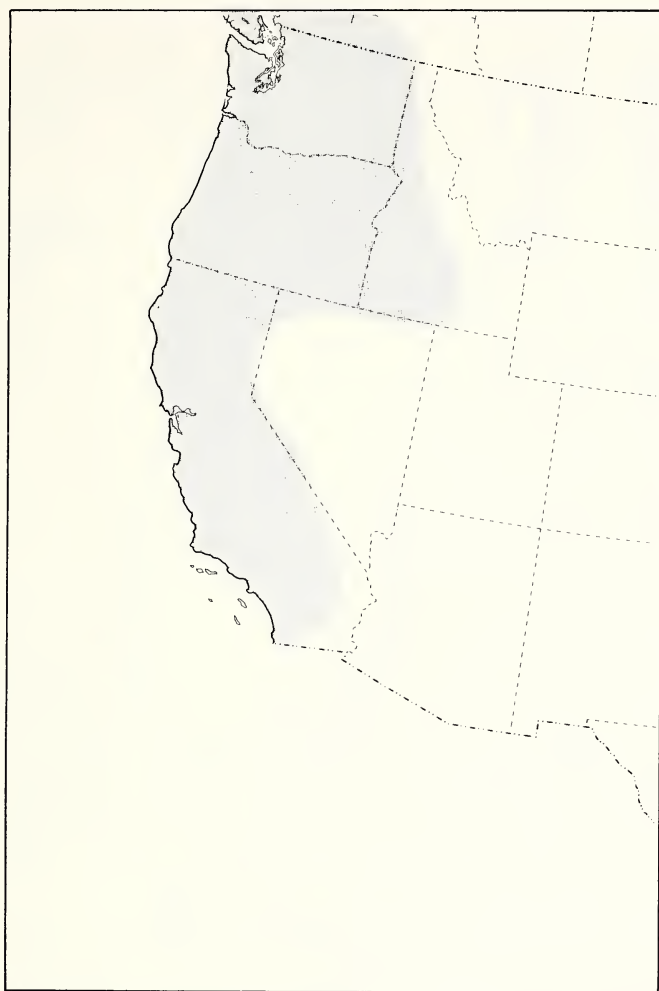


Fig. 77. Distribution. *Scymnus (S.) caurinus*.

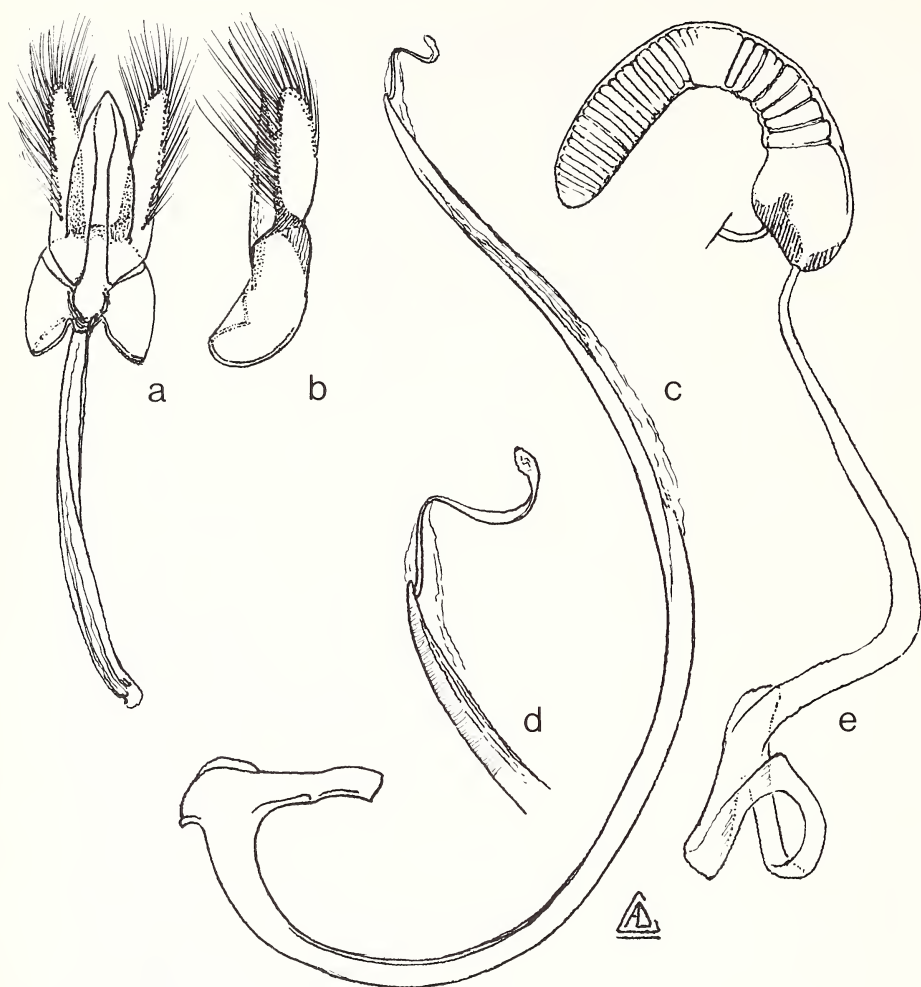


Fig. 78. *Scymnus (S.) indianensis*.

Scymnus (Scymnus) indianensis Weise
Fig. 78a-c; Map, Fig. 79

Scymnus indianensis Weise, 1929, p. 33.

Scymnus (Scymnus) indianensis: Korschefsky, 1931, p. 160.—Wingo, 1952, p. 27.—J. Chapin, 1973, p. 1071.—J. Chapin, 1974, p. 20.—Gordon, 1976b, p. 30.

Scymnus (Scymnus) rusticus Casey, 1899, p. 154 (not Weise, 1895a).—Leng, 1920, p. 214.

For detailed description, and discussion see Gordon, 1976b, p. 30.



Fig. 79. Distribution. *Scymnus (S.) indianensis*.

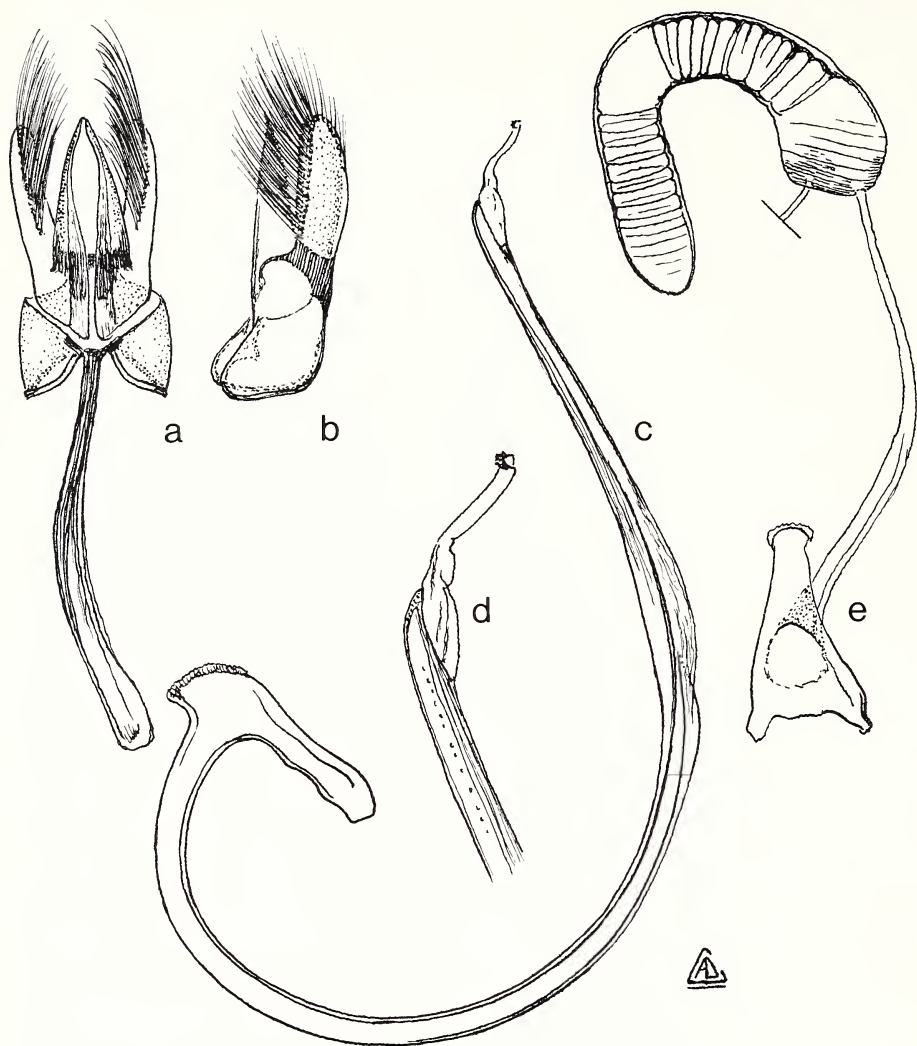


Fig. 80. *Scymnus (S.) circumspectus*.

Scymnus (Scymnus) circumspectus Horn

Fig. 80a-e; Map, Fig. 81

Scymnus circumspectus Horn, 1895, p. 96.

Scymnus (Scymnus) circumspectus: Casey, 1899, p. 153.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 156.—Wingo, 1952, p. 27.—J. Chapin, 1974, p. 20.—Gordon, 1976b, p. 32.

For detailed description, and discussion see Gordon, 1976b, p. 32.

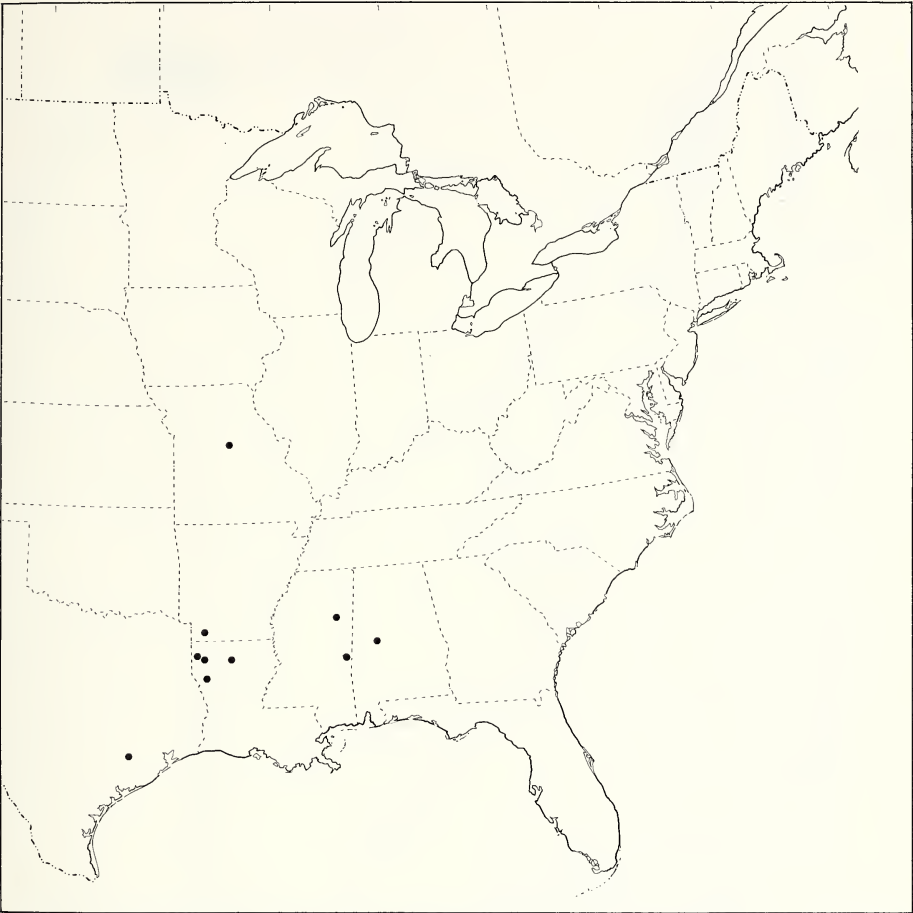


Fig. 81. Distribution. *Scymnus (S.) circumspectus*.

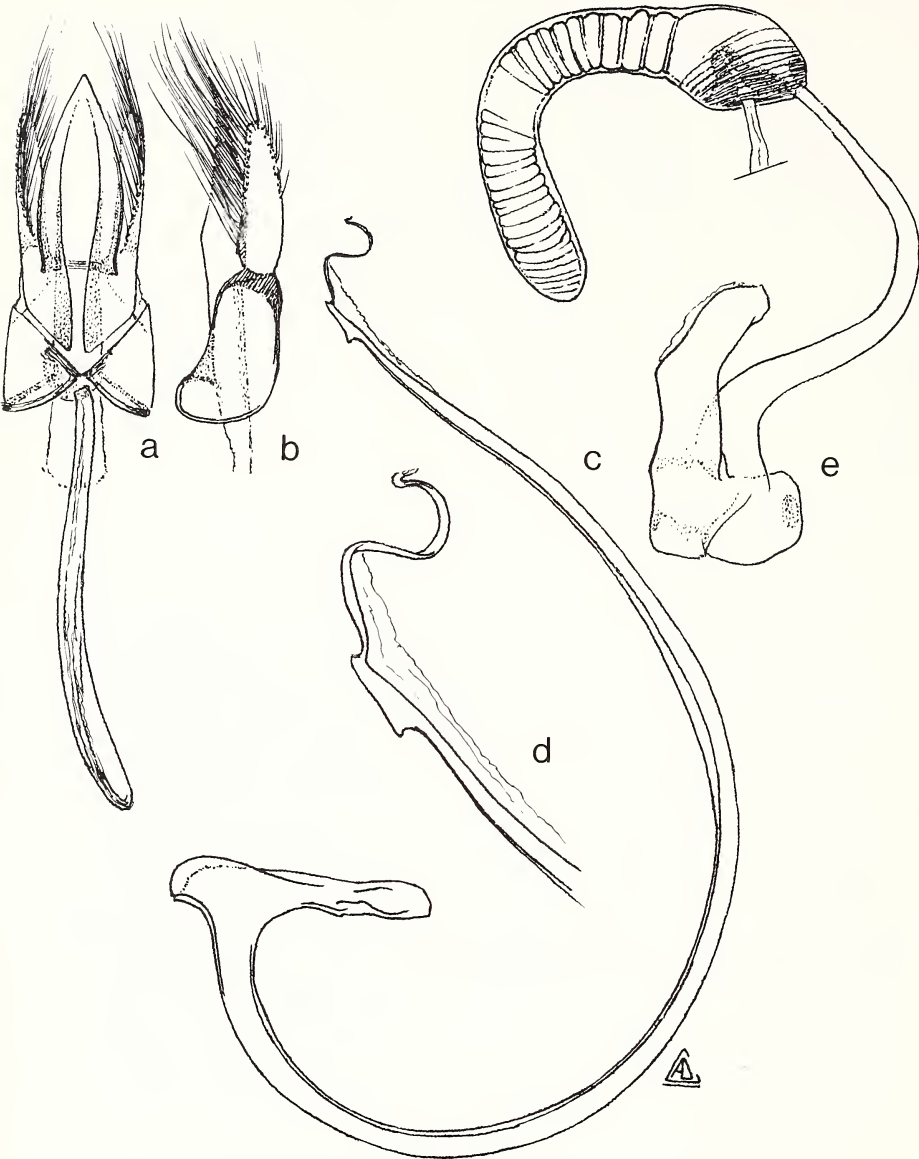


Fig. 82. *Scymnus* (*S.*) *americanus*.

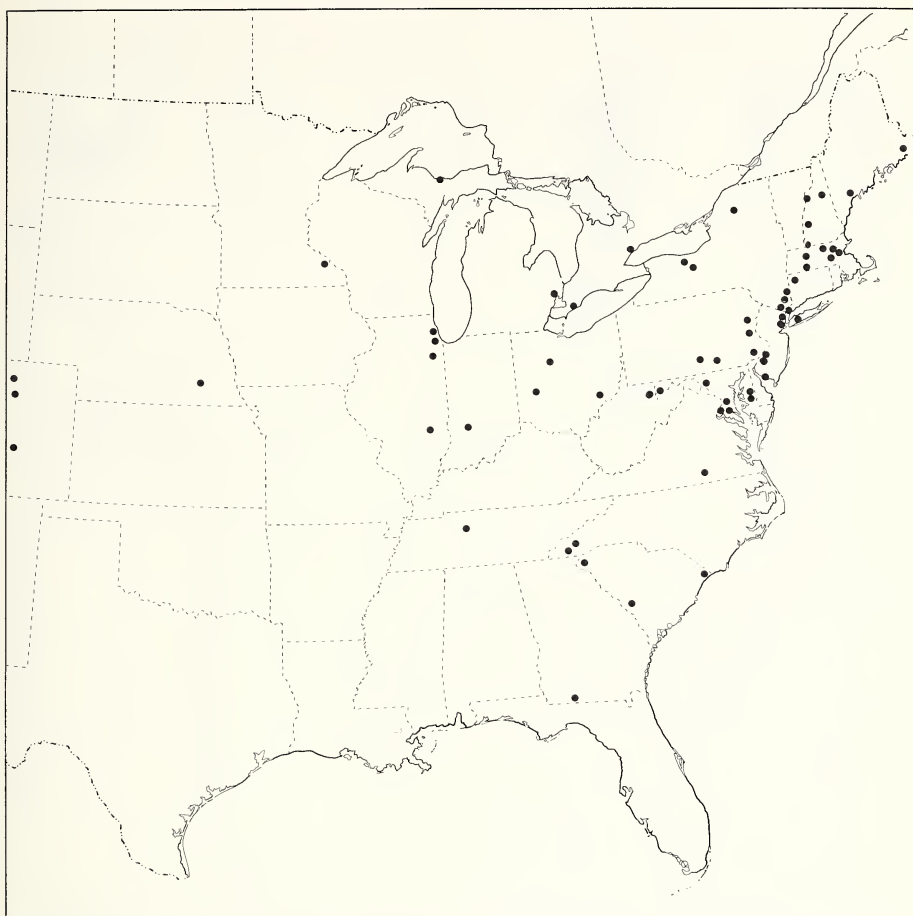


Fig. 83. Distribution. *Scymnus (S.) americanus*.

Scymnus (Scymnus) americanus Mulsant

Fig. 82a-e; Map, Fig. 83

Scymnus (Scymnus) americanus Mulsant, 1850, p. 965.—Casey, 1899, p. 153.—Blatchley, 1910, p. 526.—Wingo, 1952, p. 27.—Gordon, 1976b, p. 35.

Scymnus americanus: LeConte, 1852, p. 137.—Crotch, 1874b, p. 262.—Horn, 1895, p. 97.—Wilson, 1927, p. 170.

For detailed description, and discussion see Gordon, 1976b, p. 35.

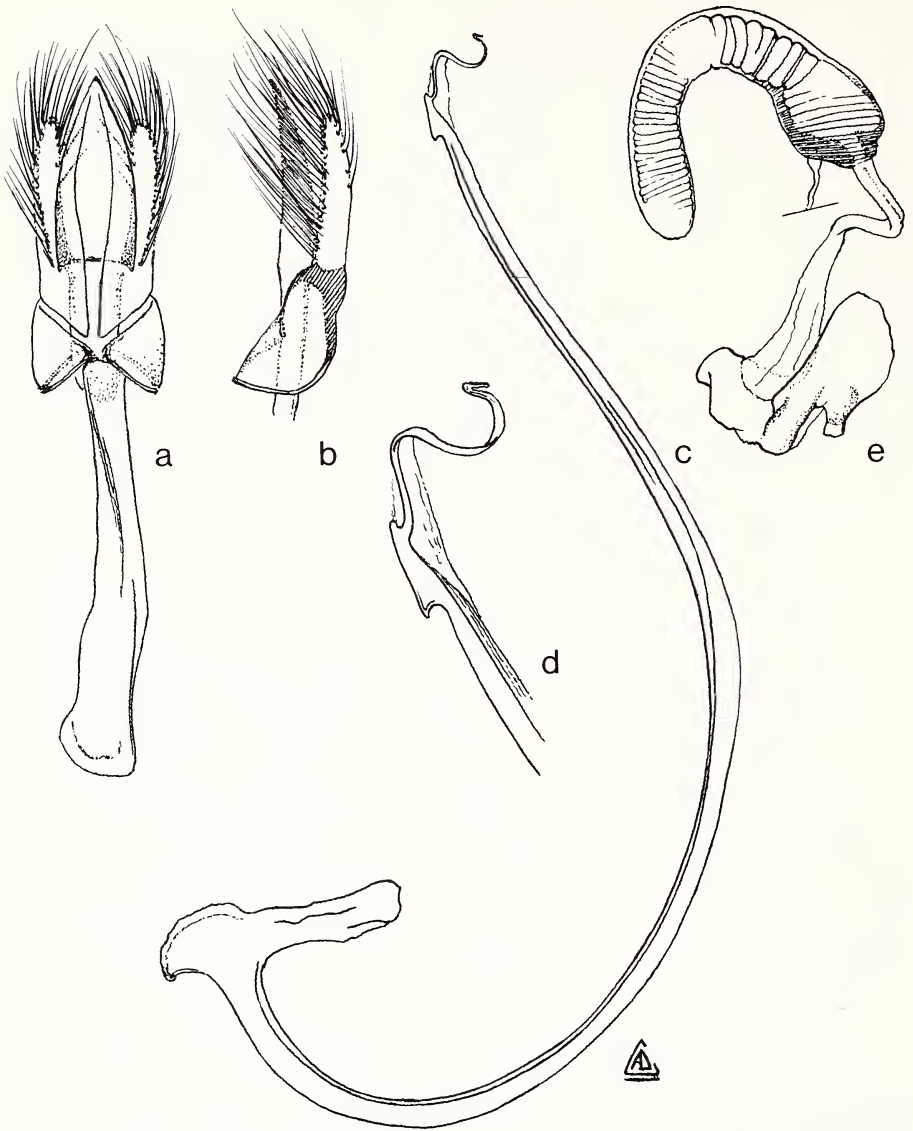


Fig. 84. *Scymnus (S.) apicanus apicanus*.



Fig. 85. Distribution. *Scymnus (S.) apicanus apicanus* (dot); *S. a. pseudapicanus* (star).

Scymnus (Scymnus) apicanus apicanus J. Chapin

Fig. 84a-e; Map, Fig. 85

Scymnus (Scymnus) apicanus J. Chapin, 1973, p. 1071.—J. Chapin, 1974, p. 20.—Gordon, 1976b, p. 38.—Belicek, 1976, p. 301.

For detailed description, and discussion see Gordon, 1976b, p. 38.

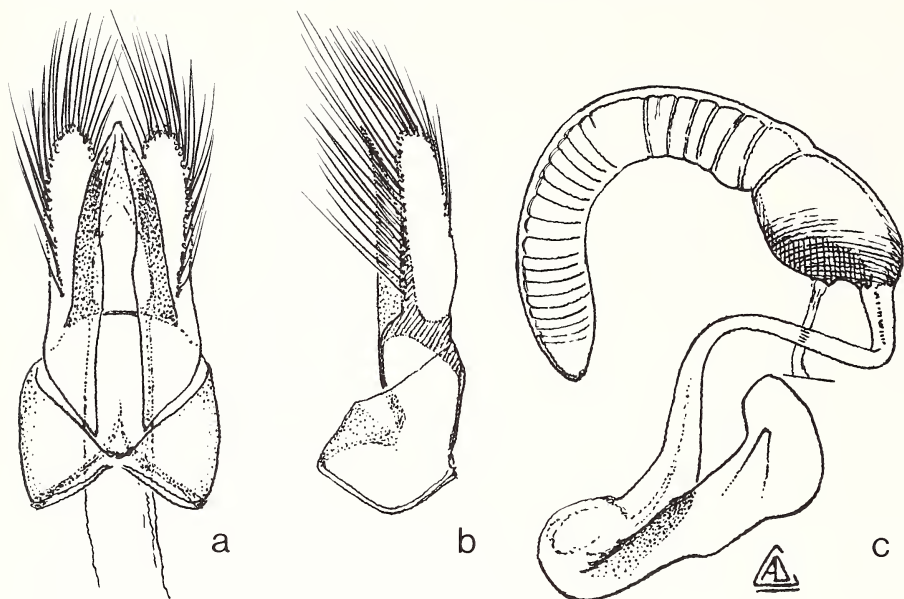


Fig. 86. *Scymnus (S.) apicanus pseudapicanus*.

Scymnus (Scymnus) apicanus pseudapicanus, new name

Fig. 86a-c; Map, Fig. 85

Scymnus (Scymnus) apicanus borealis Gordon, 1976b, p. 38, not *Scymnus borealis* Hatch, 1961.

For detailed description, and discussion see Gordon, 1976b, p. 38.

Scymnus (Scymnus) paracanus paracanus J. Chapin

Fig. 87a-e; Map, Fig. 88

Scymnus (Scymnus) paracanus J. Chapin, 1973, p. 1071.—J. Chapin, 1974, p. 21.—Gordon, 1976b, p. 41.—Belicek, 1976, p. 302.

For detailed description, and discussion see Gordon, 1976b, p. 41.

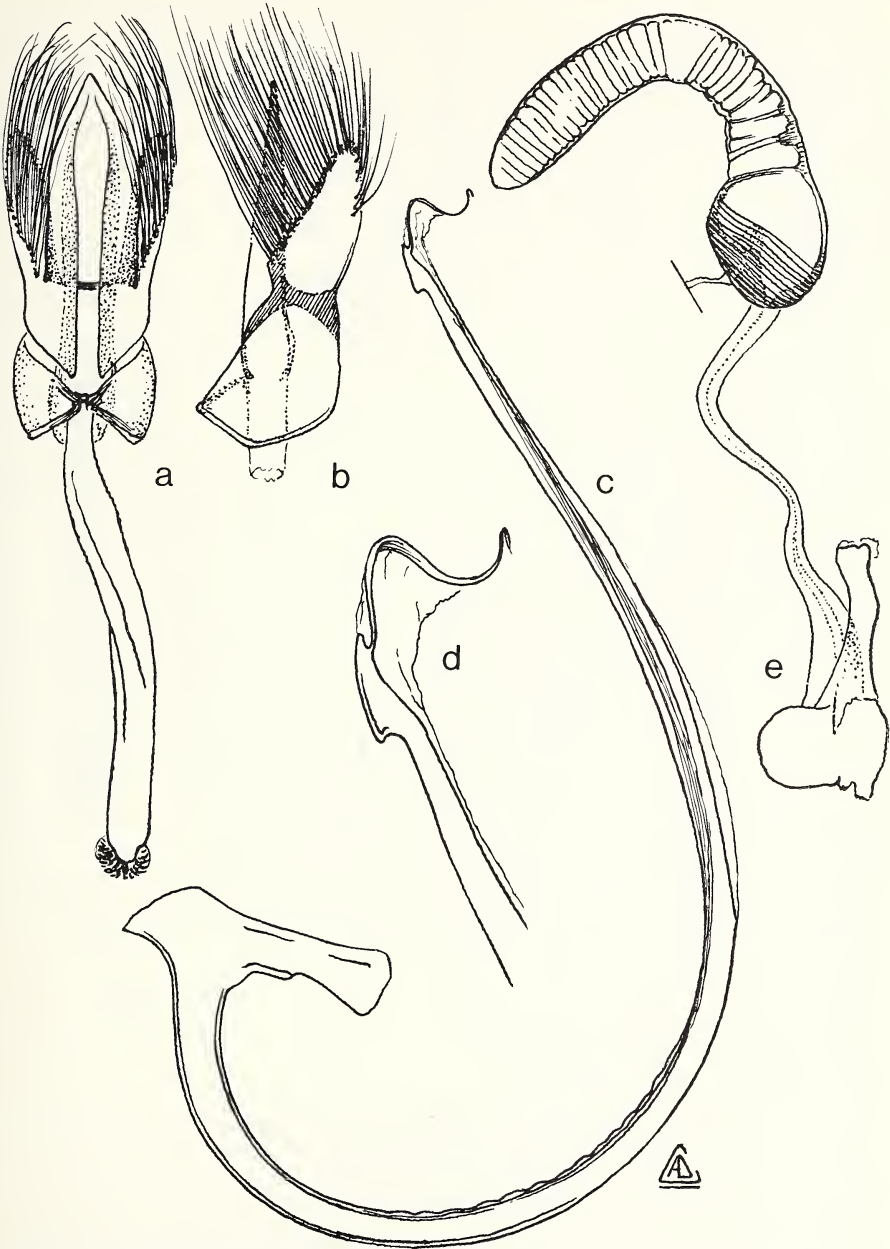


Fig. 87. *Scymnus* (*S.*) *paracanus paracanus*.



Fig. 88. Distribution. *Scymnus* (*S.*) *paracanus paracanus* (dot); *S. p. linearis* (star).

Scymnus (*Scymnus*) *paracanus linearis* Gordon
Fig. 89a-e; Map, Fig. 88

Scymnus (*Scymnus*) *paracanus linearis* Gordon, 1976b, p. 44.

For detailed description, and discussion see Gordon, 1976b, p. 41.

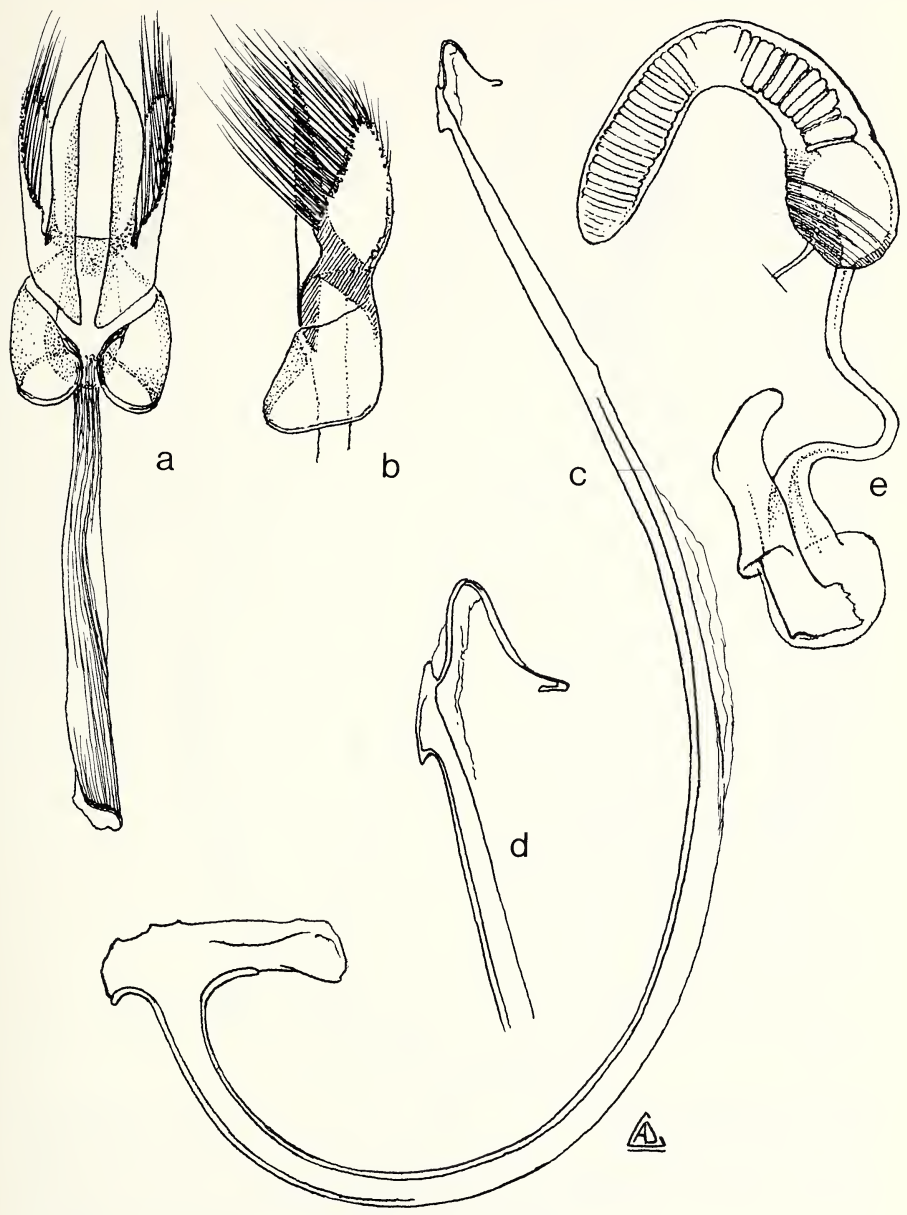


Fig. 89. *Scymnus (S.) paracanus linearis*.

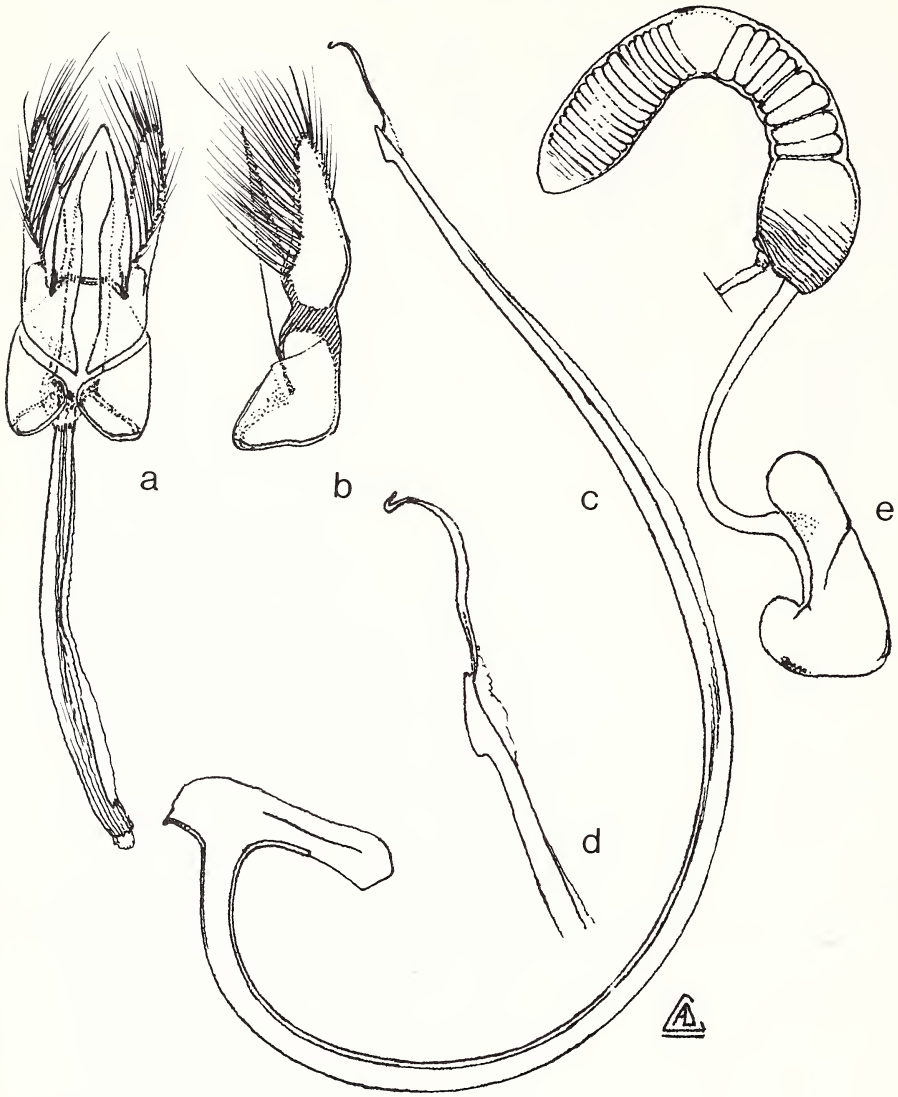


Fig. 90. *Scymnus* (*S.*) *opaculus*.

Scymnus (*Scymnus*) *opaculus* Horn

Fig. 90a-e; Map, Fig. 91

Scymnus opaculus Horn, 1895, p. 96.—Casey, 1899, p. 160.

Scymnus (*Scymnus*) *opaculus*: Leng, 1920, p. 214.—Korschefsky, 1931, p. 163.—Hatch, 1961, p. 151.—Gordon, 1976b, p. 45.—Belicek, 1976, p. 302.

For detailed description, and discussion see Gordon, 1976b, p. 45.

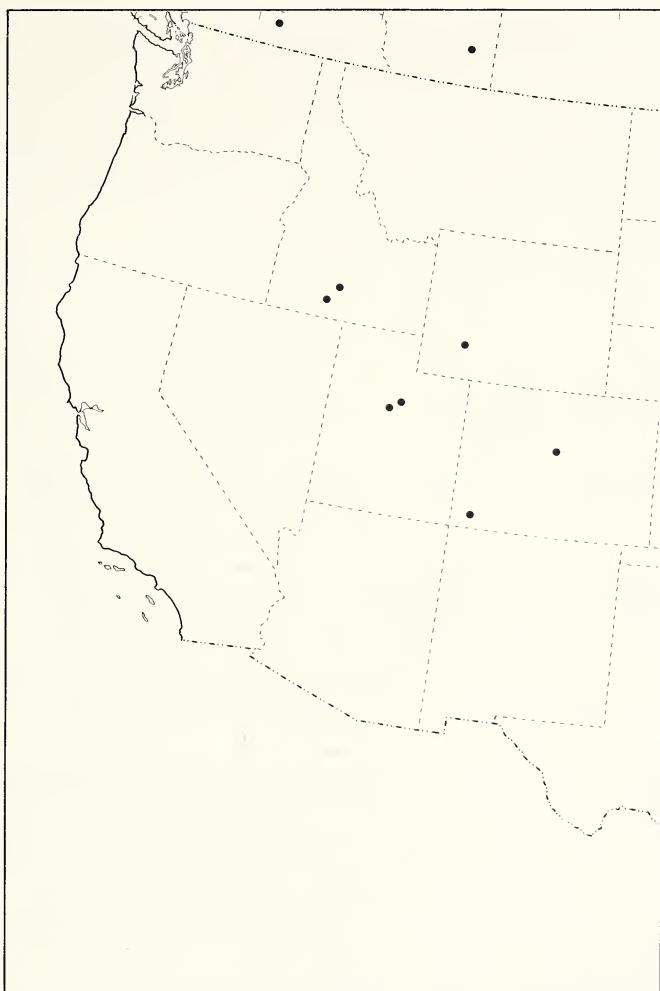


Fig. 91. Distribution. *Scymnus (S.) opaculus*.

Subgenus *Pullus* Mulsant

Pullus Mulsant, 1846, p. 241.—Mulsant, 1850, p. 976.—Weise, 1885a, p. 65.—Casey, 1899, p. 139.—Mader, 1924, p. 8.—Wingo, 1952, p. 11.—Fursch, 1958, p. 79.—Bielawski, 1959, p. 37.—Arnett, 1963, p. 812.—J. Chapin, 1974, p. 22.—Gordon, 1976b, p. 48.—Belicek, 1976, p. 303. Type-species: *Coccinella subvillosa* Goeze, by subsequent designation of Korschefsky, 1931.

Antenna 11-segmented (Fig. 68b); apical segment of maxillary palpus cylindrical, obliquely truncate apically. Prosternum with 2 strong carinae nearly always reaching anterior margin. Tarsus cryptotetramerus. Postcoxal line complete, recurved apically, reaching base of first abdominal sternum (Fig. 68g); male 5th and 6th abdominal sterna moderately to strongly emarginate and impressed apically.

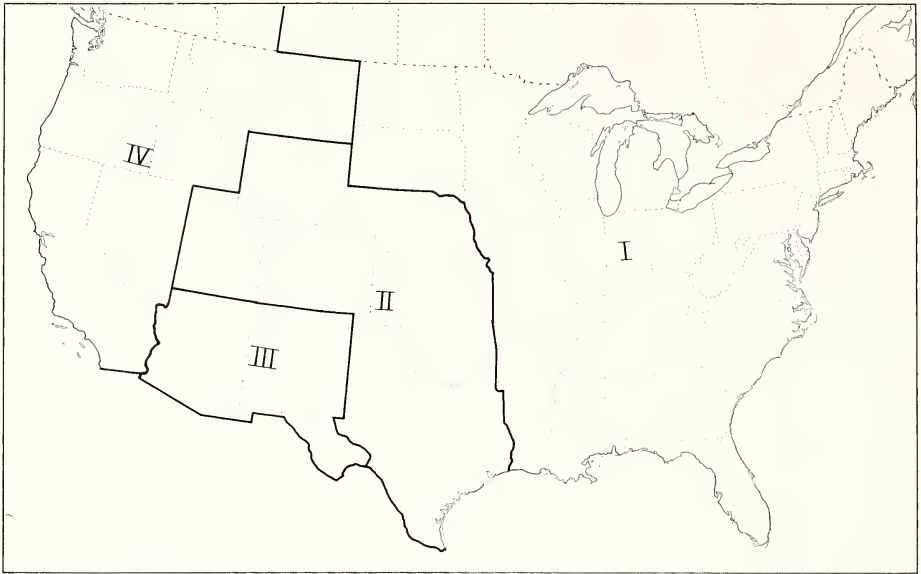


Fig. 92. Regions corresponding to the keys to species of *Scymnus* (*Pullus*).

KEY TO THE SPECIES OF *Scymnus* (*Pullus*) OF REGION I
Map, Fig. 92

1. Male with tubercle at center of first abdominal sternum; pronotum black or dark with an obscure, narrow, pale anterior border; leg entirely black or piceous (see *postpictus* Casey) *marginicollis* Mannerheim
- Male lacking abdominal tubercle; pronotum variable but if black then with anterior border also black; leg variable but rarely entirely dark 2
- 2(1). Dorsal color pattern light reddish yellow with a dark median area extending from basal portion of pronotum posteriorly along elytral suture, narrowed at apex of elytron (Fig. 130e) (see *nugator* Casey) *loewii* Mulsant
- Dorsal color pattern not as described above 3
- 3(2). Color entirely light yellowish brown; introduced into Eastern Canada and North Carolina (see *suturalis* Thunberg) *impexus* (Mulsant)
- Color not entirely yellowish brown, usually mostly black (except some forms of *brullei*) 4
- 4(3). Species entirely black dorsally except head may be partly or entirely pale, apex of elytron sometimes narrowly red or yellow, pronotal angle sometimes obscurely paler than disc 5
- Species with at least anterior pronotal angle pale red or yellow, usually with pronotum entirely pale or with a black, parabolic spot anterior to scutellum ... 9
- 5(4). Apex of elytron with a distinct yellow border *pulvinatus* Wingo
- Apex of elytron black or barely perceptibly red 6
- 6(5). Abdomen with median area of last 3 sterna distinctly pale, yellowish brown; anterior pronotal angle with a relatively broad, obscure area noticeably paler than disc; length less than 2.00 mm *compar* Casey

- Abdomen usually entirely black; anterior pronotal angle entirely black or with very narrow paler area on margin; length more than 2.0 mm (except *abbreviatus*) 7
- 7(6). Length 1.90 to 2.05 mm; 1st abdominal sternum of male with a tri-angular, feebly depressed, shining area medially *abbreviatus* LeConte
- Length 2.0 mm or more, nearly always more than 2.20 mm; 1st abdominal sternum of male with a flattened median area, not depressed, somewhat rectangular 8
- 8(7). Average length 2.30–2.40 mm; form broad, robust; male genitalia as in Figure 138 *tenebrosus* Mulsant
- Average length 2.10–2.20 mm; form elongate, slender; male genitalia as in Figure 211 *lacustris*
- 9(4). Elytron entirely light brown or with dark areas in basal ½ *brullei* Mulsant
- Elytron with at least basal ½ black 10
- 10(9). Pronotum entirely red or yellow 11
- Pronotum with at least median, basal projection black, usually with a large, black, parabolic spot medially 14
- 11(10). Form rounded, sides of elytra not parallel; lateral pronotal margin continuous with lateral margin of elytron; male with last sternum distinctly impressed 12
- Form elongate, sides of elytra parallel at least medially; pronotum narrower than elytra at base; male with last sternum barely perceptibly impressed . *kansanus* Casey
- 12(11). Elytron with large, red, apical spot, often occupying apical jhi 13
- Elytron with apex narrowly red *cervicalis* Mulsant
- 13(12). Form robust, rounded; apex of elytral spot strongly arcuate *nemorivagus* Wingo
- Form elongate; apex of elytral spot feebly arcuate (Fig. 108) *semiruber* Horn
- 14(10). Elytron with a distinct, pale area or spot in apical jhl 15
- Elytron black, usually with a narrow, apical red or yellow border, always straight, never taking the form of a defined spot 22
- 15(14). Form elongate, sides parallel medially; elytron with large, apical red spot extending forward at suture (Fig. 120) *festatus* Wingo
- Form rounded, sides not parallel, apical spot not extending forward at suture .. 16
- 16(15). Pronotum entirely red except basal median projection black; posterior third or more of elytron red 17
- Color combination not as above 18
- 17(16). Species known only from Missouri and Arkansas; male genitalia with basal lobe heavily sclerotized, almost rectangular with a small median projection (Fig. 123) *nemorivagus* Wingo
- Species known only from extreme eastern United States, Massachusetts to Florida; male genitalia with basal lobe feebly sclerotized, slender, apex pointed (Fig. 108) *semiruber* Horn
- 18(16). Length 2.00 mm or less, width less than 1.50 mm.; dorsal pubescence short, appressed, grayish white; apical spot on elytron curved toward apex at suture (Fig. 116) *rubricaudus* Casey
- Characters not all as above 19
- 19(18). Length more than 2.00 mm, width 1.40 mm or more; dorsal pubescence long, erect, yellowish white; apical spot on elytron as described for *rubricaudus*: pronotum entirely black except antero-lateral angle pale *securus* J. Chapin
- Not entirely as described above; pronotum usually pale with black median spot 20
- 20(19). Elytron with red apical spot usually occupying at least apical ¼, red (Fig. 225); last sternum of male deeply emarginate, lateral angle of emargination abrupt .. *brullei* Mulsant

- Elytron with apical pale spot restricted to apical $\frac{1}{2}$ (Fig. 125); last sternum of male feebly emarginate, feebly impressed 21
- 21(20). Male genitalia with dorsal processes of basal lobe convergent apically (Fig. 127) *louisianae* J. Chapin
- Male genitalia with dorsal processes of basal lobe widely separated apically (Fig. 125) *fraternus* LeConte
- 22(14). Male genitalia with ventral ala strongly fused to basal lobe, apex of basal lobe bluntly triangular (Fig. 215) *caudalis* LeConte
- Male genitalia not as described above 23
- 23(22). Last sternum of male deeply emarginate, lateral angle of emargination abrupt; genitalia robust, heavily sclerotized, dorsal margin of paramere with long setae (Fig. 225) *brullei* Mulsant
- Male genitalia not as described above 24
- 24(23). First sternum of male with a deep, elongate-oval pit surrounded by dense hairs, often with a faint, longitudinal carina in middle of pit (Fig. 150); basal lobe of genitalia with ventral projection blunt *iowensis* Casey
- First sternum and genitalia not as described above 25
- 25(24). First sternum of male with a small, deep, triangular pit at apical margin; basal lobe of genitalia with ventral apical projection feebly developed, an elongate-oval, lightly sclerotized area on each side of middle in ventral view (Fig. 170) *consobrinus* LeConte
- First sternum and genitalia not as described above 26
- 26(25). Male genitalia with apex of basal lobe pointed, abruptly hooked downward in lateral view (Fig. 198) *uncus* Wingo
- Male genitalia not as described above 27
- 27(26). Male genitalia with basal lobe and ventral ala fused, apex of basal lobe projecting, pointed, (Fig. 200) *puncticollis* LeConte
- Male genitalia not as described above 28
- 28(27). Male genitalia with ventral projection of basal lobe tapered to a point, much longer than dorsal projection (Fig. 136) *socer* LeConte
- Male genitalia not as described above 29
- 29(28). Male genitalia heavily sclerotized, basal lobe broad, apex triangular in dorsal view, ventral projection tapered to a blunt point in ventral view (Fig. 153) *majus*, new name
- Male genitalia not as described above 30
- 30(29). Male genitalia with apex of basal lobe bluntly rounded, fused to ventral ala, margins of siphonal passage fused before apex (Fig. 218) *creperus* Mulsant
- Male genitalia not as described above 31
- 31(30). Male genitalia with basal lobe fused to ventral ala, apex of basal lobe flattened, triangularly spatulate, projecting beyond ventral ala (Fig. 217) *peninsularis* Gordon
- Male genitalia with basal lobe pointed apically; paramere slender, lower margin produced medially (Fig. 187) *wingoi* Gordon

KEY TO THE SPECIES OF *Scymnus* (*Pullus*) OF REGION II

Map, Fig. 92

- 1. Elytron black with a large, median, reddish orange spot (Fig. 98) ... *pacificus* Crotch
- Elytron without median spot 2
- 2(1). Form extremely elongate, parallel-sided; lateral margin of pronotum and elytron strongly discontinuous (Fig. 93) *coniferarum* Crotch

- Form oval, not parallel-sided; lateral margin of pronotum and elytron not noticeably discontinuous 3
- 3(2). Dorsal surface pale yellowish brown, elytron and pronotum unicolorous; length 2.00 mm or less; elytron distinctly alutaceous *pallens* LeConte
- Dorsal surface dark, or with a contrasting color pattern, not entirely pale, if pronotum and elytron unicolorous then length more than 2.25 mm; elytron not alutaceous 4
- 4(3). Dorsal color reddish brown, scutellum and sutural margin of elytron narrowly black; length 2.00 mm or less *nugator* Casey
- Dorsal color not as described above 5
- 5(4). Length less than 1.77 mm; pronotum pale yellowish brown, elytron dark reddish brown; Texas, Big Bend *pauculus* Gordon
- Length nearly always more than 1.75 mm; color pattern not as described above or if so, then length more than 2.50 mm 6
- 6(5). Dorsal color pattern light brown with a dark median area extending from basal portion of pronotum posteriorly along elytral suture, narrowed at apex of elytron (Fig. 130e) *loewii* Mulsant
- Color pattern not as described above 7
- 7(6). Form elongate, nearly parallel-sided; dorsal color pattern either entirely reddish brown or with a median, black, pronotal spot *flavescens* Casey
- Color pattern not as above, or, if so, then form distinctly rounded (*brullei* Mulsant) 8
- 8(7). Length 2.00 mm or less; dorsal color pattern light yellowish brown with basal projection of pronotum and narrow sutural border dark brown to black, some specimens also with a black lateral and anterior border on elytron; Texas, Big Bend *enochrus* Gordon
- Length usually more than 2.00 mm.; color pattern not as described above 9
- 9(8). Pronotum entirely red or yellow 10
- Pronotum with at least median, basal projection black 11
- 10(9). Form rounded, sides of elytra not parallel; lateral pronotal margin continuous with lateral margin of elytron; male with last sternum distinctly impressed *cervicalis* Mulsant
- Form elongate, sides of elytra nearly parallel, at least medially; pronotum narrower than elytra at base; male with last sternum barely perceptibly impressed *kansanus* Casey
- 11(9). Dorsal color entirely light reddish brown except some dark color on pronotum, sometimes an obscure dark area present on basal jhi of elytron (Fig. 225); male with last sternum strongly emarginate, angle of emargination abrupt *brullei* Mulsant
- Dorsal color and male last sternum not as described above 12
- 12(11). Species with a large, definite pale area at apex of elytron 13
- Species with apex of elytron black or with a more or less well-defined, pale apical border, never a definite pale spot (see *socer* LeConte) 17
- 13(12). Punctures on elytron coarse, arranged in curved, transverse rows, giving a slightly rugose appearance; male first sternum with tubercle medially *postpictus* Casey
- Punctures on elytron fine, not arranged in rows; male first sternum without tubercle 14
- 14(13). Length less than 2.10 mm, form elongate, nearly parallel-sided (Fig. 116) *rubricaudus* Casey
- Length more than 2.10 mm; form rounded, not parallel-sided 15
- 15(14). Elytron with apical spot usually restricted to apical $\frac{1}{8}$, yellow (Fig. 125); last sternum of male feebly emarginate, feebly impressed 16

- Elytron with apical spot usually occupying at least apical $\frac{1}{4}$ (Fig. 225); last sternum of male deeply emarginate, lateral angle of emargination abrupt *brullei* Mulsant
- 16(15). Male genitalia with dorsal processes of basal lobe convergent apically (Fig. 127) *louisianae* J. Chapin
- Male genitalia with dorsal processes of basal lobe widely separated (Fig. 125) *fraternus* LeConte
- 17(12). Postcoxal line reaching hind margin of first sternum; form elongate, almost parallel-sided; apex of elytron distinctly reddish yellow *monticola* Casey
- Postcoxal line not reaching hind margin of first sternum; color and form variable 18
- 18(17). Pronotum entirely black or black with a very small, obscure, paler area at antero-lateral angle 19
- Pronotum mostly pale with a central dark area, or at least with antero-lateral angle broadly, distinctly red or yellow (see *horni* Gorham) 28
- 19(18). Known from the eastern edge of Region II (see *compar* Casey) . . *tenebrosus* Mulsant
- Known from Colorado westward (see *weidti* Casey) 20
- 20(19). Male genitalia with basal lobe slender, nearly as long as ventral ala, not fused to ventral ala (Fig. 157) *renoicus* Casey
- Male genitalia not as described above 21
- 21(20). Male genitalia with basal lobe much shorter than ventral ala, not fused to ala, inner portion of ala lightly sclerotized, outer portion heavily sclerotized (Fig. 160) *mormon* Casey
- Male genitalia not as described above 22
- 22(21). Male genitalia pale, nearly transparent (Fig. 166) *aridus* Casey
- Male genitalia darkened, definitely sclerotized 23
- 23(22). Male genitalia with apex of ventral projection of basal lobe robust, truncate (Fig. 151) *calaveras* Casey
- Male genitalia not as described above 24
- 24(23). Male genitalia with basal lobe and ventral ala fused, apex more or less pointed in lateral view (Fig. 197) 25
- Male genitalia with basal lobe and ventral ala fused, apex broadly rounded in lateral view 27
- 25(24). Sclerotized area of ventral ala nearly truncate apically, apex of basal lobe bluntly pointed (Fig. 197) *papago* Casey
- Male genitalia not as described above 26
- 26(25). Sclerotized area of ventral ala deeply emarginate apically, apex of basal lobe sharply pointed (Fig. 192) *wickhami* Gordon
- Sclerotized area of ventral ala not emarginate, rounded apically, apex of basal lobe sharply pointed (Fig. 184) *impletus* Gordon
- 27(24). Male genitalia with apex of basal lobe wide in lateral view, slightly enlarged before apex (Fig. 211) *lacustris* LeConte
- Male genitalia with apex of basal lobe narrow in lateral view, not enlarged before apex (Fig. 213) *tahoensis* Casey
- 28(18). Elytron strongly alutaceous, feebly shining; length about 2.00 mm . . . *uteanus* Casey
- Elytron not noticeably alutaceous, strongly shining; length usually more than 2.00 mm 29
- 29(28). Pronotum mostly yellow or red with a small parabolic spot medially at base, spot not approaching anterior margin of pronotum 30
- Pronotum mostly black with lateral margin and/or antero-lateral angle yellow or red, anterior margin of pronotum black or very narrowly pale 35
- 30(29). Elytron with apical pale border wide, at least $\frac{1}{4}$ of a mm; pronotal spot small,

- usually confined to area just anterior to basal median projection (see *uncus* Wingo) *creperus* Mulsant
- Elytron with apical pale border narrow, less than 1/6 of a mm.; pronotal spot usually extending ' the distance to anterior margin or more 31
- 31(30). Form rounded; length 2.40 mm *garlandicus* Casey
- Form elongate; length 2.25 mm or less 32
- 32(31). Male genitalia with basal lobe and ventral ala not fused (Fig. 150) 34
- Male genitalia with basal lobe and ventral ala fused (Fig. 174) 33
- 33(32). Male genitalia short, compact, feebly sclerotized (Fig. 174) *cockerelli* Casey
- Male genitalia long, slender, lightly sclerotized (Fig. 215) *caudalis* LeConte
- 34(32). Male genitalia with ventral projection of basal lobe bluntly rounded, only slightly longer than dorsal projection (Fig. 150); male with pit on first sternum deep, elongate-oval, often with a fine, longitudinal carina at middle (Fig. 150) *iowensis* Casey
- Male genitalia with ventral projection of median lobe pointed, distinctly longer than dorsal projection (Fig. 186); median area of male first sternum glabrous, slightly flattened, densely punctured *simulans* Gordon
- 35(29). Length 2.00 mm or less 36
- Length more than 2.10 mm 38
- 36(35). Male genitalia pale, nearly transparent 37
- Male genitalia darkened, definitely sclerotized (Fig. 156) *utahensis* Gordon
- 37(36). Male genitalia with apex of dorsal projection of basal lobe broad, truncate (Fig. 162) *ardelio* Casey
- Male genitalia with apex of dorsal projection of basal lobe slender, no wider than ventral projection (Fig. 166) *aridus* Casey
- 38(35). Dorsal pubescence at least partly yellowish brown 39
- Dorsal pubescence entirely grayish or yellowish white 40
- 39(38). Black area of pronotum extending to anterior margin of pronotum, broad antero-lateral angle pale *barberi* Gordon
- Black area of pronotum not quite reaching anterior margin medially, broad antero-lateral angle and narrow anterior border pale *solidus* Casey
- 40(38). Male genitalia with basal lobe and ventral ala fused; male without pit on first sternum 41
- Male genitalia with basal lobe and ventral ala not fused, ventral projection of basal lobe bluntly rounded (Fig. 150); male with deep elongate-oval pit on first sternum (Fig. 150) *iowensis* Casey
- 41(40). Male genitalia with central carinae of basal lobe divergent at apex, leaving a blunt, triangular apical area (Fig. 215) *caudalis* LeConte
- Male genitalia with central carinae of basal lobe not divergent, apex of basal lobe pointed in ventral view (Fig. 211) *lacustris* LeConte

KEY TO THE SPECIES OF *Scymnus* (*Pullus*) OF REGION III

Map, Fig. 92

1. Elytron with a large, median, reddish orange spot (Fig. 98) *pacificus* Crotch
- Elytron without a median spot 2
- 2(1). Length nearly twice the width; lateral margin of pronotum strongly discontinuous with lateral margin of elytron; elytron yellowish brown with suture and scutellum usually black or dark brown (Fig. 93) *coniferarum* Crotch
- Length much less than twice the width; lateral pronotal margin more or less continuous with elytron; color variable 3

- 3(2). Dorsal color primarily light brown or yellow, with or without a dark pattern . . . 4
 – Dorsal color primarily black or dark brown, with or without pale areas 12
- 4(3). Postcoxal line on first sternum reaching hind margin of sternum 5
 – Postcoxal line on first sternum not reaching hind margin of sternum 6
- 5(4). Form elongate; pronotum entirely pale or with a median black area; postcoxal line angulate *flavescens* Casey
 – Form rounded; pronotum always black at least medially; postcoxal line rounded, not angulate *nigricollis* Gordon
- 6(4). Elytron distinctly alutaceous, feebly shining; dorsum entirely light yellowish brown; form round; length less than 2.00 mm *pallens* LeConte
 – Elytron not alutaceous, shining; dorsum with or without a dark pattern, length variable 7
- 7(6). Form elongate; dorsum entirely yellowish brown *mimoides* Gordon
 – Form not particularly elongate, dorsum not entirely yellowish brown 8
- 8(7). Length less than 1.75 mm, pronotum pale yellowish brown, elytron reddish brown; Texas, Big Bend *pauculus* Gordon
 – Length more than 1.75 mm; color pattern not as described above 9
- 9(8). Length 2.00 mm or less; dorsal color pattern light yellowish brown with basal projection of pronotum and narrow sutural border dark brown to black, some specimens also with a black lateral and anterior border on elytron; Texas, Big Bend *enochrus* Gordon
 – Length usually more than 2.00 mm, color pattern not as described above 10
- 10(9). Dorsal color pattern light brown with a dark median area extending from basal portion of pronotum posteriorly along elytral suture, narrowed at apex of elytron (Fig. 130e) *loewii* Mulsant
 – Color pattern not as described above 11
- 11(10). Length 2.00 mm or slightly less; paramere of male genitalia as broad as basal lobe (Fig. 177) *nugator* Casey
 – Length 1.75 mm or less; paramere of male genitalia narrower than basal lobe (Fig. 179) *neomexicanus* Gordon
- 12(3). Pronotum entirely red or yellow *cervicalis* Mulsant
 – Pronotum black at least basally 13
- 13(12). Apical $\frac{1}{4}$ to $\frac{1}{2}$ of elytron red (Fig. 134); punctures on elytron coarse, arranged in curved, transverse rows, giving a slightly rugose appearance to elytron; male first sternum with tubercle *postpictus* Casey
 – Species with all characters not as described above 14
- 14(13). Male with tubercle at middle of first sternum; elytron black except narrow apical border pale; leg usually all black; pronotum with color variable but always with at least a narrow anterior border pale *marginicollis* Mannerheim
 – Male without tubercle; leg usually pale or at least apical $\frac{1}{4}$ of tibia pale 15
- 15(14). Species with a distinct pale area on apex of elytron, or a pale, discal spot 16
 – Species with apex of elytron black or with a straight pale border, never with a distinct pale spot 18
- 16(15). Species with a transversely oval, yellow spot restricted to apical $\frac{1}{4}$ of elytron 17
 – Species with apical $\frac{1}{4}$ to $\frac{1}{2}$ of elytron red or with an elongate, median, red spot on elytron (Fig. 130) *loewii* Mulsant
- 17(16). Pronotum black, anterolateral angle very narrowly yellow; male 1st sternum not depressed medially, coarsely, densely punctured *caffer* Gordon
 – Pronotum usually with median, parabolic, black spot, at least antero- lateral angle broadly yellow or red; male 1st sternum depressed medially, finely, densely punctured *louisianae* J. Chapin

- 18(15). Pronotum entirely black (see *tahoensis* Casey) 19
 - Pronotum with at least anterolateral angle distinctly pale 24
- 19(18). Male genitalia with apex of ventral apical projection truncate in ventral view (Fig. 151) *calaveras* Casey
 - Male genitalia not as described above 20
- 20(19). Male genitalia with basal lobe and ventral ala fused, apex of basal lobe sharply pointed (Fig. 184) *impletus* Gordon
 - Male genitalia not as described above 21
- 21(20). Male genitalia with median area of ventral ala not sclerotized, and elongate-oval area on each side of basal lobe also unsclerotized (Fig. 190) *tenebricus* Gordon
 - Male genitalia not as described above 22
- 22(21). Male genitalia with sclerotized area of anterolateral angle of ventral ala produced, basal lobe with 2 median folds (Fig. 197) *papago* Casey
 - Male genitalia not as described above 23
- 23(22). Male genitalia with basal lobe and ventral ala strongly united, basal lobe slightly shorter than ventral ala, apex rounded in lateral view (Fig. 202) *weidti* Casey
 - Male genitalia with basal lobe shorter than ventral ala, inner portion of ventral ala membranous, extending beyond outer portion (Fig. 160) *mormon* Casey
- 24(18). Elytron strongly alutaceous, feebly shining; pronotum pale red with a small, black, parabolic spot anterior to scutellum *uteanus* Casey
 - Elytron not noticeably alutaceous, strongly shining; pronotum variable 25
- 25(24). Elytron not black but a dark mahogany brown with sutural and lateral borders obscurely black, apex of elytron with a wide, pale border; length usually less than 2.00 mm *gilae* Casey
 - Elytron black, apex of elytron with a narrow, pale border 26
- 26(25). Pronotum pale with a black, basal spot not approaching anterior margin of pronotum 27
 - Pronotum mostly black, black area either reaching anterior border or very narrowly separated from it 32
- 27(26). Pronotum with black area poorly defined, restricted to median, basal $\frac{1}{3}$ of pronotum *creperus* Mulsant
 - Pronotum with black area parabolic, well defined, extending more than ' the distance to apical margin 28
- 28(27). Male genitalia with apical ventral process of basal lobe long, stout, curved upward in lateral view (Fig. 143) *garlandicus* Casey
 - Male genitalia not as described above 29
- 29(28). Male genitalia of the *brullei* type, basal lobe inflated (Fig. 223) .. *hubbardi* Gordon
 - Male genitalia not as described above 30
- 30(29). Male genitalia with basal lobe and ventral ala fused (Fig. 174) *cockerelli* Casey
 - Male genitalia not as described above 31
- 31(29). Male genitalia without ventral ala (Fig. 129) *apithanus* Gordon
 - Male genitalia with ventral ala (Fig. 159) *horni* Gorham
- 32(26). Pronotum black with anterolateral angle narrowly yellow; femur black except apex pale *aridoides* Gordon
 - Pronotum with anterolateral angle broadly pale yellow; femur with at least apical ' pale 33
- 33(32). Male genitalia of the *brullei* type but with membranous lateral projection as in figure 34
 - Male genitalia not of the *brullei* type, lacking membranous lateral projections . 35
- 34(33). Black area of pronotum separated from anterior margin by a narrow, yellow border; Texas (Big Bend) *howdeni* Gordon

- Black area of pronotum reaching anterior margin; Arizona *huachuca* Gordon
- 35(33). Male genitalia with apical ventral process of basal lobe long, stout, curved upward in lateral view (Fig. 143) *garlandicus* Casey
- Male genitalia not as described above 36
- 36(35). Male genitalia with basal lobe inflated in lateral view, a winglike lobe on each side of siphonal aperture (Fig. 220) *bryanti* Gordon
- Male genitalia not as described above 37
- 37(36). Male genitalia with apical ventral process of basal lobe long, broad at base, tapered to blunt apex (Fig. 154) *ignarus* Gordon
- Male genitalia not as described above 38
- 38(37). Male genitalia lightly sclerotized, nearly transparent 39
- Male genitalia normally sclerotized 40
- 39(38). Male genitalia with apical dorsal projection of basal lobe broad, truncate at apex (Fig. 162) *ardelio* Horn
- Male genitalia with apical dorsal projection tapered to a point (Fig. 166) *aridus* Casey
- 40(38). Male genitalia with inner border of ventral ala sclerotized (Fig. 142a) (see *humboldti* Casey) *solidus* Casey
- Male genitalia with inner border of ventral ala not sclerotized (Fig. 148) *barberi* Gordon

KEY TO THE SPECIES OF *Scymnus* (*Pullus*) OF REGION IV
Map, Fig. 92

- 1. Elytron with a large, median, reddish orange spot (Fig. 98) *pacificus* Crotch
- Elytron without a median spot 2
- 2(2). Length nearly twice the width; lateral margin of pronotum strongly discontinuous with lateral margin of elytron; elytron yellowish brown with suture and scutellum usually black or dark brown (Fig. 93) *coniferarum* Crotch
- Length much less than twice the width; lateral pronotal margin more or less continuous with elytron; color variable 3
- 3(2). Dorsal surface distinctly alutaceous, completely pale yellowish brown *pallens* LeConte
- Dorsal surface not noticeably alutaceous, at least some dark areas present, usually almost completely black 4
- 4(3). Dorsal color pattern light brown with a dark median area extending from basal portion of pronotum posteriorly along elytral suture, narrowed at apex of elytron (Fig. 130), lateral border may also be dark (Fig. 130) *loewii* Mulsant
- Dorsal color not as described above 5
- 5(4). Apical 2/3 of elytron yellowish red, rest of elytron and pronotum except narrow lateral border black (Fig. 140); California (Channel Islands) *falli* Gordon
- Color pattern not as described above 6
- 6(5). Dorsal color primarily pale yellowish brown with some dark marking 7
- Dorsal color primarily black or dark brown, sometimes with pale marking 8
- 7(6). Form elongate, margins of elytra subparallel; sutural border of elytron narrowly black, an obscure dark border on lateral margin *mimoides* Gordon
- Form round, margins of elytra not parallel; sutural border of elytron narrowly black but with no dark lateral border *cockerelli* Casey
- 8(6). Apical 1/4 to 1/3 of elytron red (Fig. 134); punctures on elytron coarse, arranged in

- curved, transverse rows, giving a slightly rugose appearance to elytron; male 1st sternum with tubercle medially *postpictus* Casey
- Apex of elytron black or narrowly pale; elytron not appearing rugose; male 1st sternum not tuberculate (except *marginicollis*) 9
- 9(8). Male with median tubercle on 1st sternum; elytron black except narrow apical border; legs usually all black or at least femora entirely black; pronotum varying from almost entirely yellow to nearly all black but with at least apical border narrowly pale *marginicollis* Mannerheim
- Male 1st sternum without tubercle; legs usually pale but if black then at least apex of femur pale 10
- 10(9). Pronotum entirely red or yellow (see *cervicalis* Mulsant) *carri* Gordon
- Pronotum at least partly black 11
- 11(10). Pronotum mostly yellow or red with a black area medially anterior to scutellum, black area not approaching anterior margin of pronotum 12
- Pronotum mostly or entirely black, black area reaching anterior margin or very narrowly separated from it 14
- 12(11). Postcoxal line reaching hind margin of 1st sternum; elytron distinctly micro-reticulate (see *uteanus* Casey) *nevadensis* Weise
- Postcoxal line not reaching hind margin of 1st sternum; elytron not micro-reticulate or feebly so 13
- 13(12). Length less than 2.00 mm.; 1st sternum of male densely punctured medially *erythronotum* Gordon
- Length 2.00 mm or more, 1st sternum of male with a flattened, shining, impunctate area medially (see *garlandicus* Casey) *horni* Gorham
- 14(11). Elytron dark mahogany brown with suture and lateral border black, apex of elytron with a wide, pale border; length less than 2.00 mm *gilae* Casey
- Elytron black or black with a pale apical border; length variable but usually more than 2.00 mm 15
- 15(14). Pronotum entirely black 16
- Pronotum with at least anterolateral angle pale 28
- 16(15). Large, robust, length usually 2.65 mm or more; dorsal pubescence yellowish brown; dorsal surface entirely black except narrow apical margin pale *calaveras* Casey
- Characters not all as described above 17
- 17(16). Male genitalia with basal lobe much shorter than ventral ala (Fig. 172) 18
- Male genitalia with basal lobe as long as ventral ala or nearly so 19
- 18(17). Male genitalia with basal lobe extremely short (Fig. 172); 6th sternum of male deeply, abruptly emarginate *mendocino* Casey
- Male genitalia with basal lobe not extremely short (Fig. 194); male 6th sternum normally emarginate *elusivus* Gordon
- 19(17). Basal lobe of male genitalia slender, not fused to ventral ala 20
- Basal lobe of male genitalia robust, fused to ventral ala 21
- 20(19). Basal lobe of male genitalia with dorsal apical projection not wider than ventral apical projection, dorsal margin of basal lobe sinuate (Fig. 157) *renoicus* Casey
- Basal lobe of male genitalia with dorsal apical projection wider than ventral apical projection, dorsal margin of basal lobe not sinuate (Fig. 145) *jacobianus* Casey
- 21(19). Male genitalia with a small, elongate sclerite medially at base of basal lobe, apex bluntly pointed in lateral view, basal lobe and ventral ala fused (Fig. 202) *weidti* Casey
- Male genitalia not as described above 22
- 22(21). Apex of basal lobe of male genitalia rounded in lateral view (Fig. 207) 23
- Apex of basal lobe of male genitalia pointed in lateral view (Fig. 184) 26

- 23(22). Apex of basal lobe slender, evenly rounded in lateral view (Fig. 213) 24
 - Apex of basal lobe broad, rounded dorsally, abruptly angled ventrally in lateral view (Fig. 207) *hesperius* Gordon
- 24(23). Basal lobe with median ventral carinae slightly separated, ventral ala fused in basal $\frac{3}{4}$ (Fig. 213) *tahoensis* Casey
 - Basal lobe with median ventral carinae joined, ventral ala fused in more than basal $\frac{3}{4}$ (Fig. 211) 25
- 25(24). Apex of basal lobe as wide or wider than paramere in lateral view *lacustris* LeConte
 - Apex of basal lobe narrower than paramere in lateral view *tahoensis* Casey
- 26(22). Apex of ventral ala angulate, produced, or with a median membranous area ... 27
 - Apex of ventral ala not angulate or produced (Fig. 184) *impletus* Gordon
- 27(26). Apex of ventral ala simple, angulate (Fig. 192) *wickhami* Gordon
 - Apex of ventral ala divided by median membranous area, inner sclerotized area angulate (Fig. 190) *tenebricus* Gordon
- 28(15). Male first sternum with a deep, elongate-oval pit, pit often with a median carina; ventral apical projection of basal lobe of male genitalia rounded (Fig. 150) *iowensis* Casey
 - Male first sternum without a pit, at most with a shallow depression; ventral apical projection of basal lobe of male genitalia not as described above 29
- 29(28). Male genitalia feebly sclerotized, nearly transparent 30
 - Male genitalia distinctly sclerotized, darkened 31
- 30(29). Apex of dorsal projection of basal lobe truncate (Fig. 162) *ardelio* Horn
 - Apex of dorsal apical projection of basal lobe pointed (Fig. 166) *aridus* Casey
- 31(29). Basal lobe of male genitalia ovate in ventral view, ventral alae and paramere curved inward (Fig. 181) *nuttingi* Gordon
 - Male genitalia not as described above 32
- 32(31). Male genitalia with basal lobe and ventral ala fused 33
 - Male genitalia with basal lobe and ventral ala not fused 37
- 33(32). Basal lobe of male genitalia with apex broadly rounded in lateral view, no median sclerite at base in ventral view 34
 - Basal lobe of male genitalia slender, a median, basal sclerite present in ventral view 36
- 34(33). Median, ventral carinae of basal lobe distinctly separated at least basally (Fig. 208) *luctuosus* Casey
 - Median, ventral carinae of basal lobe united or nearly so from base to apex (Fig. 211) 35
- 35(34). Apex of basal lobe broad, broadly rounded in lateral view (Fig. 211) *lacustris* LeConte
 - Apex of basal lobe narrow in lateral view (Fig. 213) *tahoensis* Casey
- 36(33). Basal lobe of male genitalia evenly tapered from base to apex (Fig. 204) Alberta *aquilonarius* Gordon
 - Basal lobe of male genitalia narrowed before apex, apex slightly bulbous (Fig. 206); California *martini* Gordon
- 37(32). Basal lobe of male genitalia slender, tapered from base to apex (Fig. 156) *utahensis* Gordon
 - Basal lobe of male genitalia not as described above 38
- 38(37). Male genitalia with inner margin of ventral ala sclerotized, basal lobe broad (Fig. 142) *solidus* Casey
 - Male genitalia with inner margin of ventral ala not sclerotized, basal lobe slender (Fig. 146) *humboldti* Casey

Scymnus (Pullus) caffer Gordon

Fig. 96a-d

Scymnus (Pullus) caffer Gordon 1976b, p. 65.

For detailed description, and discussion see Gordon, 1976b, p. 65.

Scymnus (Pullus) coniferarum Crotch

Fig. 93a-f; Map, Fig. 95

Scymnus coniferarum Crotch, 1874a, p. 77.—Horn, 1895, p. 105.*Scymnus (Pullus) coniferarum*: Casey, 1899, p. 152.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 157.—Hatch, 1961, p. 151.—Gordon, 1976b, p. 66.—Belicek, 1976, p. 305.

For detailed description, and discussion see Gordon, 1976b, p. 66, and Gordon (1982).

Scymnus (Pullus) suturalis Thunberg

Fig. 94a-e; Map, Fig. 95

Scymnus suturalis Thunberg, 1795, p. 106.—Korschefsky, 1931, p. 138.—Gordon, 1976b, p. 66.—Gordon, 1982, p. 250 (see Korschefsky, 1931, for complete synonymy).

Diagnosis. Description as for *S. (P.) coniferarum*: Body slightly broader, less elongate in appearance; punctures on elytron coarse, dense, separated by the diameter of a puncture or less; basal lobe of male genitalia broad in ventral view, abruptly narrowed in apical $\frac{1}{4}$, apex in lateral view distinctly bent downward; apex of siphon S-shaped (figs. 94a-c); female genitalia with infundibulum slender, rodlike (fig. 94e).

Discussion. Gordon (1976b) included this species as *S. (P.) coniferarum* which is primarily a California species. Subsequent investigation revealed that the Pennsylvania and New York specimens were actually *S. (P.) suturalis* (Gordon, 1982). It was introduced into Michigan from Germany in 1961, and has recently been collected there, but whether this population is a result of the introduction or an accidental establishment is not apparent (Hoebeke, in press).

Type locality. "Suecica".

Type depository. Type not examined.

Distribution. Figure 95. CONNECTICUT: Middlesex Co., Clinton. MICHIGAN: Saginaw Co., Saginaw. NEW YORK. PENNSYLVANIA: (see Gordon, 1982, for specific localities).

Scymnus (Pullus) impexus Mulsant

Fig. 97a-d

Scymnus (Pullus) impexus Mulsant, 1850, p. 979.—Korschefsky, 1931, p. 127.—Delucchi, 1954, pp. 243-278.—Gordon, 1976b, p. 70.*Scymnus (Pullus) abietis* Mulsant, 1846, p. 247 (not Paykull, 1798).—Mulsant, 1850, p. 979.

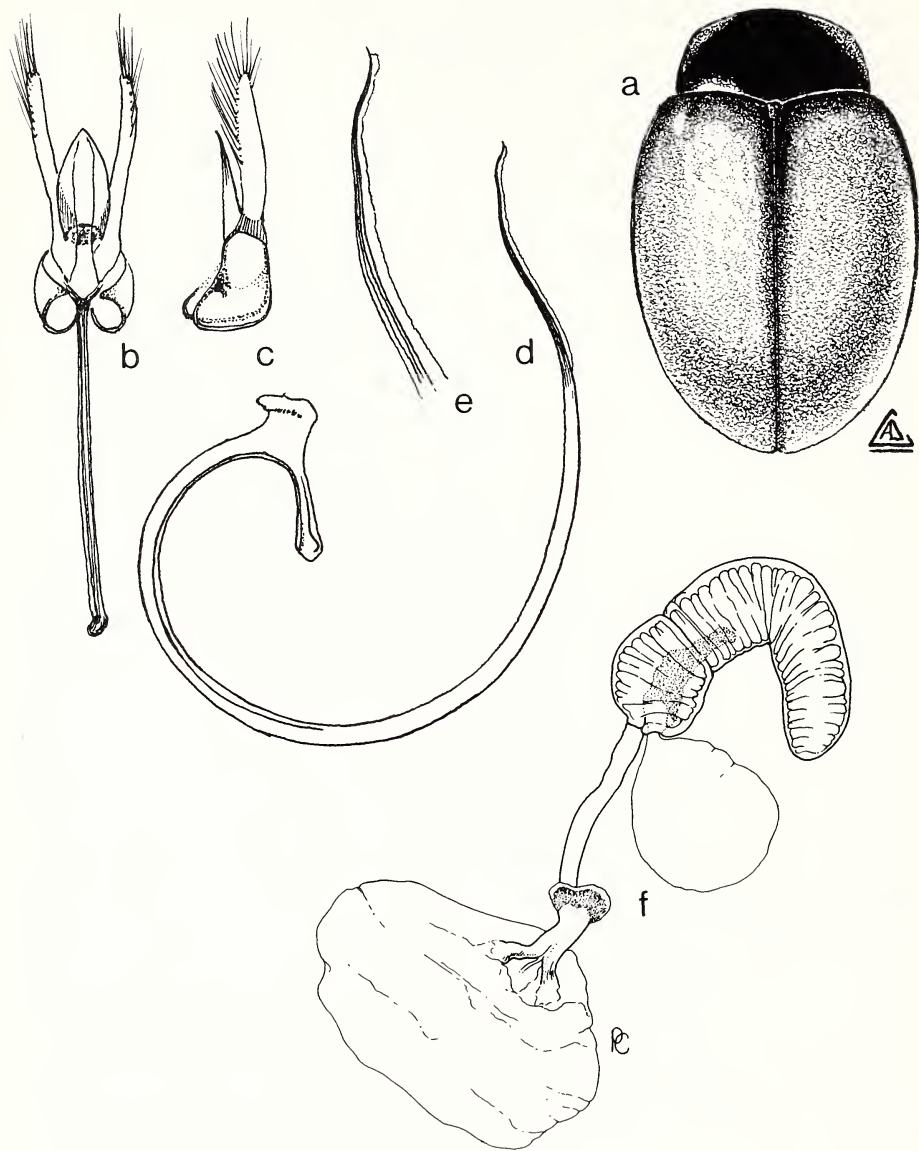


Fig. 93. *Scymnus (P.) coniferarum*.

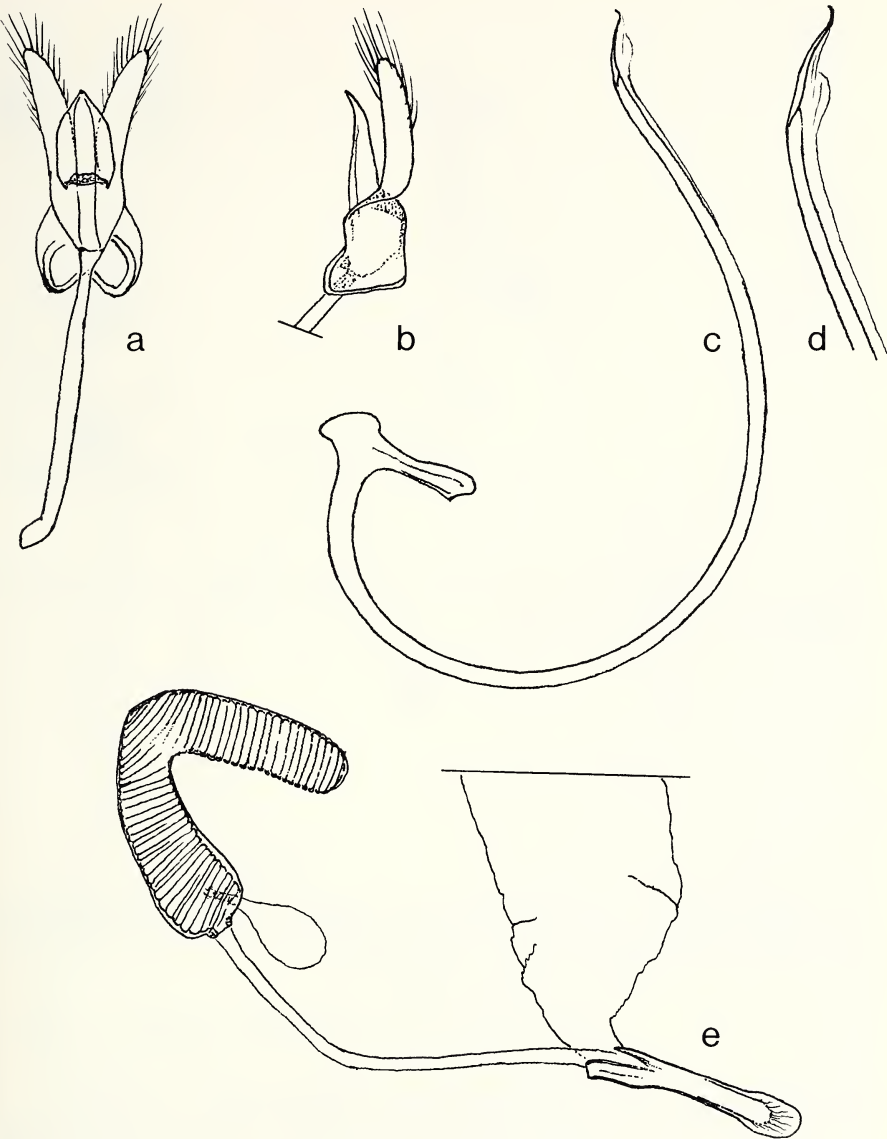


Fig. 94. *Scymnus (P.) suturalis*.

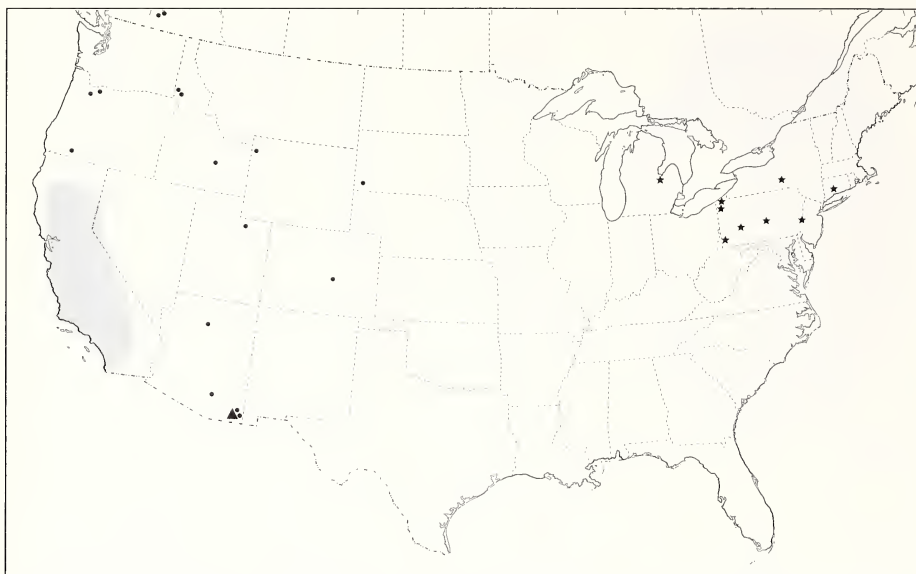


Fig. 95. Distribution. *Scymnus* (*P.*) *coniferarum* (shaded, peripheral localities dotted); *S.* (*P.*) *suturalis* (star); *S. P. caffer* (triangle).

For detailed description, and discussion see Gordon, 1976b, p. 70. Establishment of this species has been effected in the Willamette Valley of Oregon following releases made in 1960 and 1962.

Scymnus (*Pullus*) *pacificus* Crotch

Fig. 98a-e; Map, Fig. 99

Scymnus pacificus Crotch, 1874a, p. 77.—Horn, 1895, p. 100.

Scymnus (*Pullus*) *pacificus*: Casey, 1899, p. 152.—Leng, 1920, p. 214.—Korschevsky, 1931, p. 164.—Hatch, 1961, p. 151.—Gordon, 1976b, p. 72.

Scymnus strabus Horn, 1895, p. 100.—Gordon, 1976b, p. 72.

Scymnus (*Pullus*) *strabus*: Casey, 1899, p. 152.—Leng, 1920, p. 214.—Korschevsky, 1931, p. 166.

For detailed description, and discussion see Gordon, 1976b, p. 72.

Additional locality record: ARIZONA: Yavapai Co., 15 mi. S. Prescott.

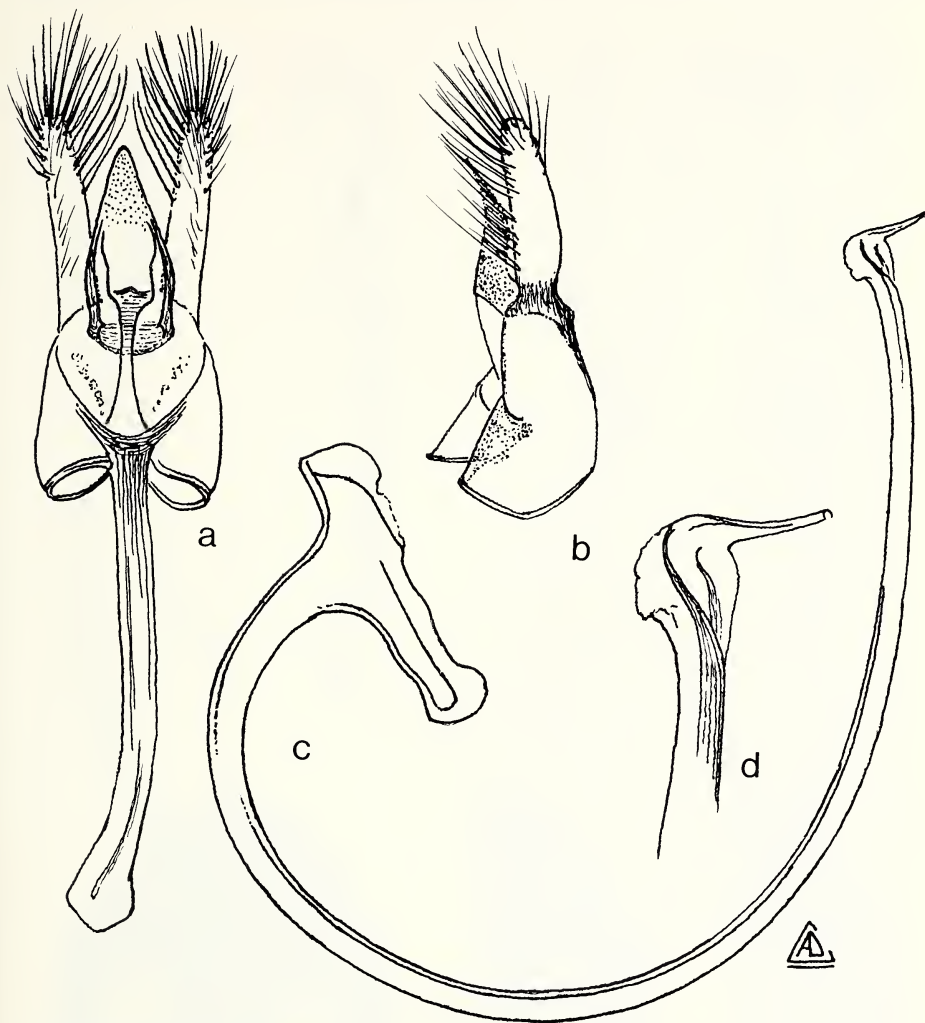


Fig. 96. *Scymnus (P.) caffer*.

Scymnus (Pullus) flavescens Casey

Fig. 100a-d; Map, Fig. 101

Scymnus (Pullus) flavescens Casey, 1899, p. 139.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 158.—Gordon, 1976b, p. 75.

For detailed description, and discussion see Gordon, 1976b, p. 75.

Additional locality records: ARIZONA: Apache Co., Chuska. UTAH: Wayne Co., Henry Mts.

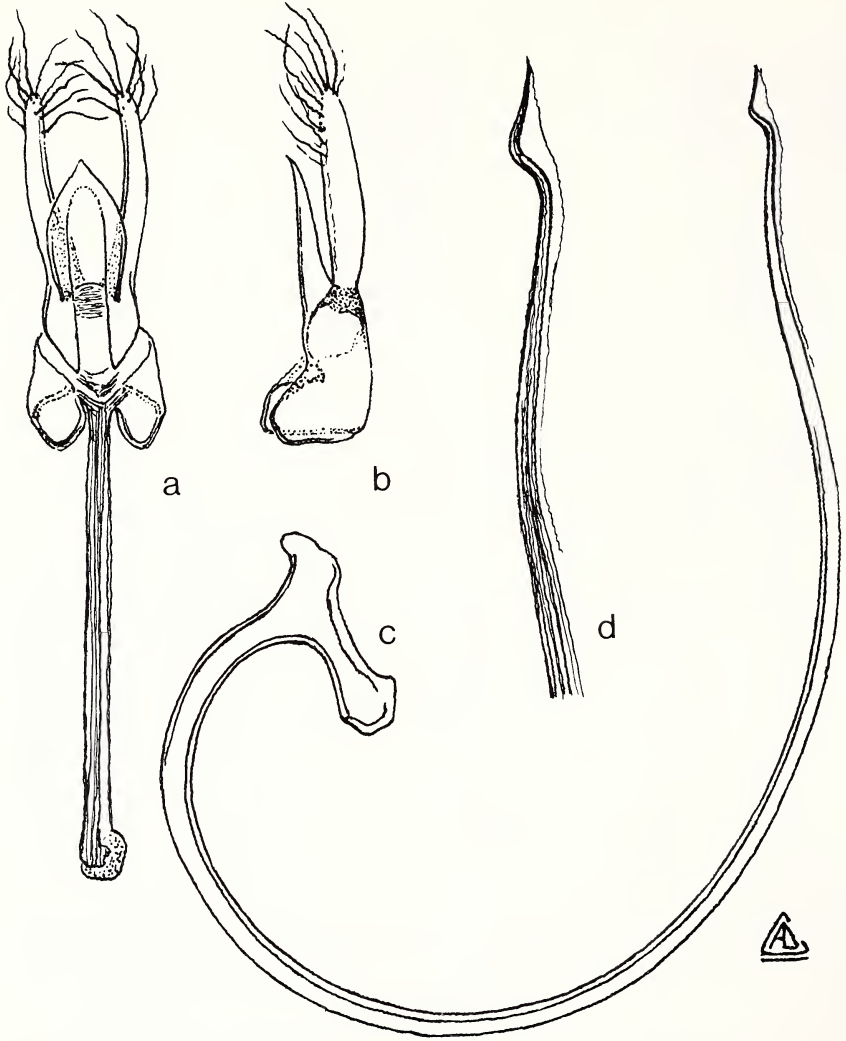


Fig. 97. *Scymnus (P.) impexus*.

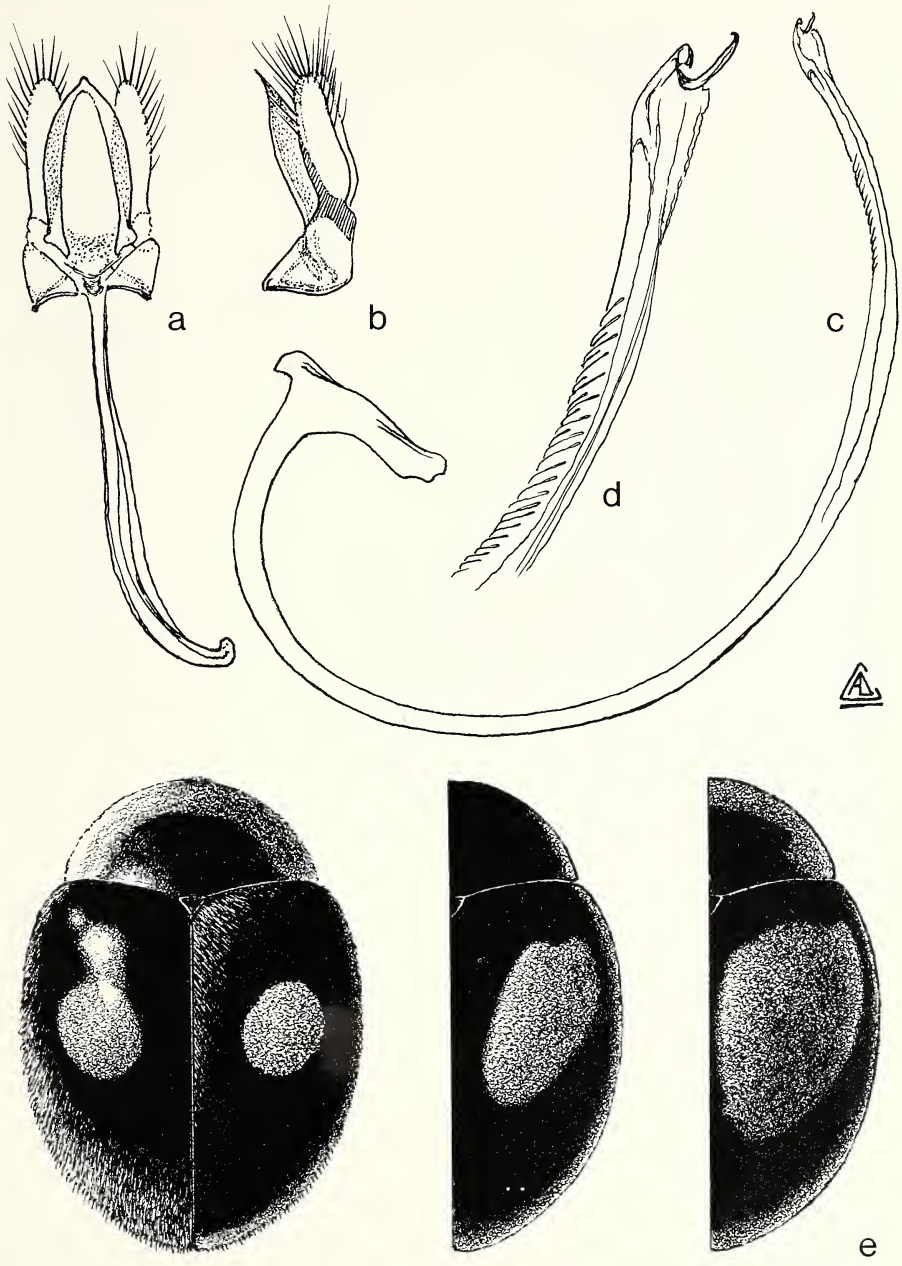


Fig. 98. *Scymnus (P.) pacificus*.

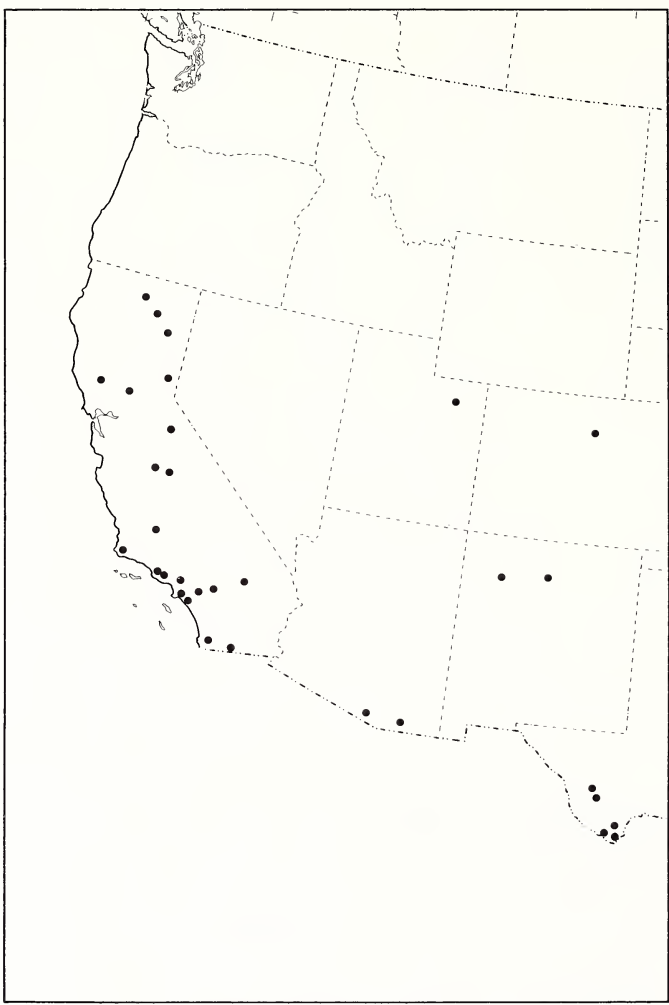


Fig. 99. Distribution. *Scymnus (P.) pacificus*.

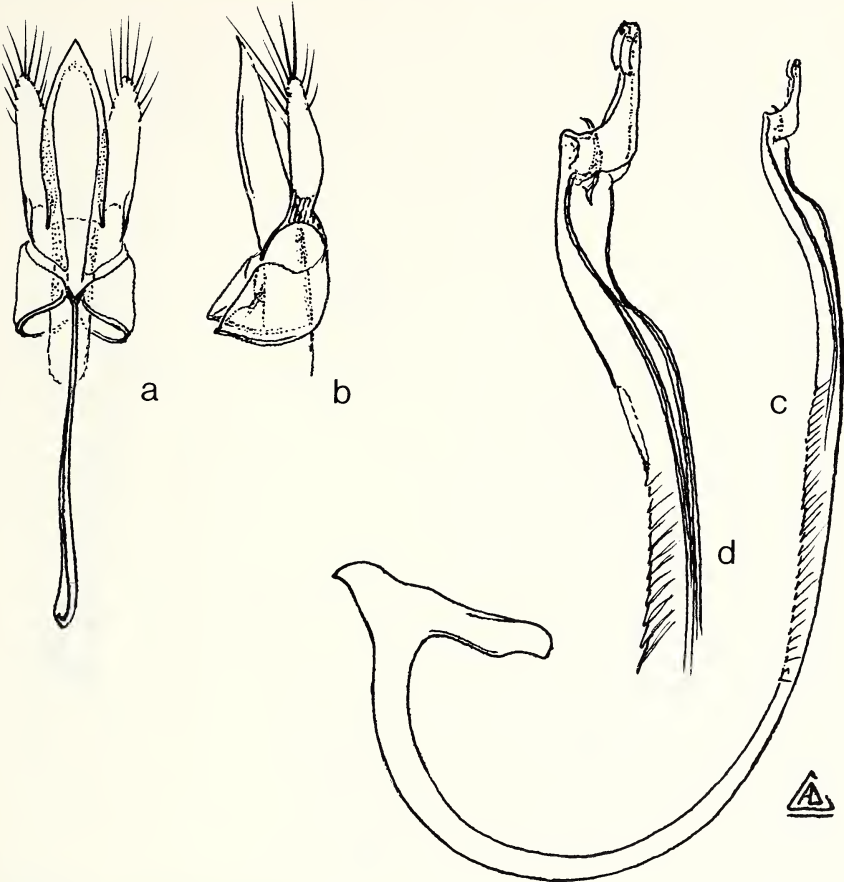


Fig. 100. *Scymnus* (*P.*) *flavescens*.



Fig. 101. Distribution. *Scymnus (P.) flavescens* (dot); *S. (P.) nigricollis* (star).

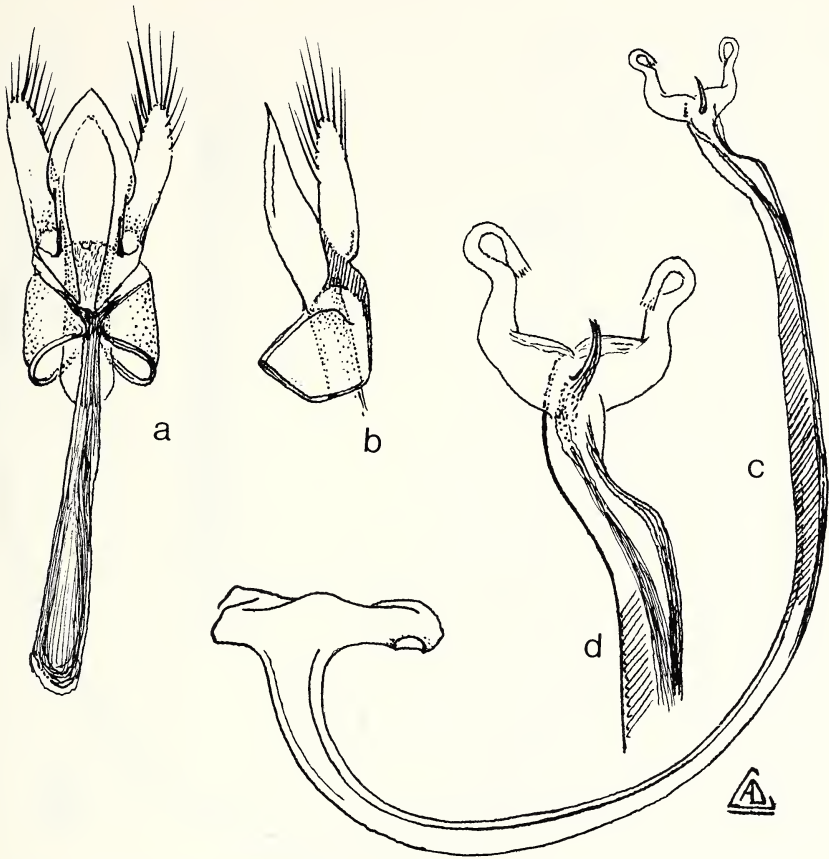


Fig. 102. *Scymnus (P.) nigricollis*.

Scymnus (Pullus) nigricollis Gordon
Fig. 102a-d; Map, Fig. 101

Scymnus (Pullus) nigricollis Gordon, 1976b, p. 78.

For detailed description, and discussion see Gordon, 1976b, p. 78.

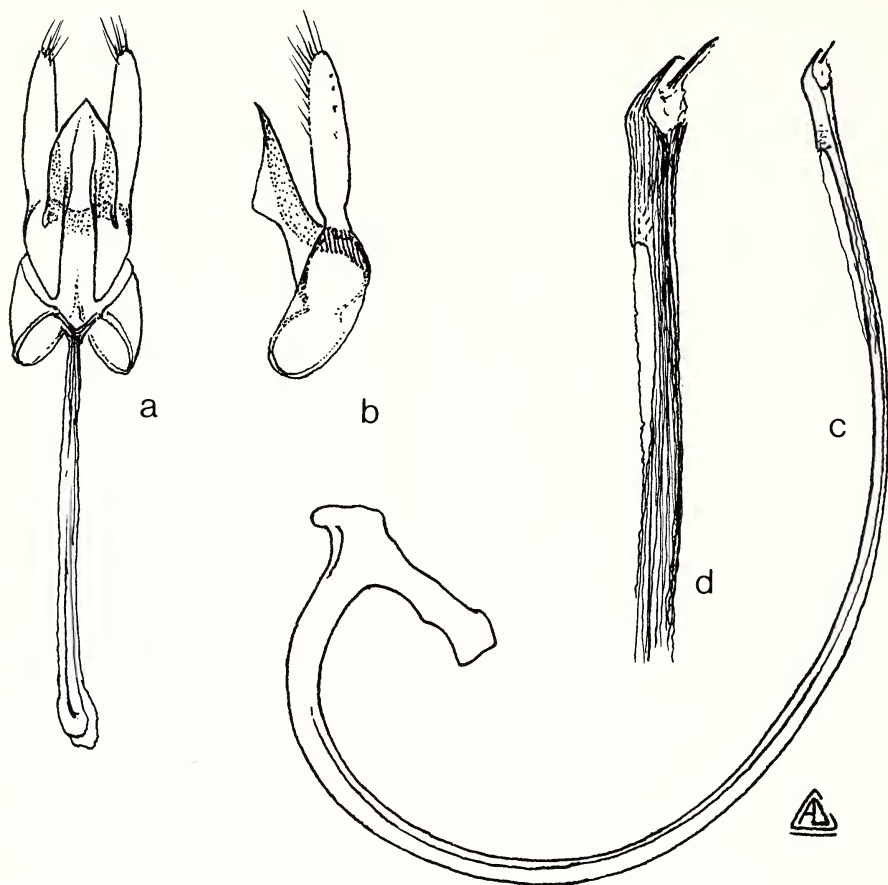


Fig. 103. *Scymnus (P.) kansanus*.

Scymnus (Pullus) kansanus Casey

Fig. 103a-d; Map, Fig. 104

Scymnus (Pullus) kansanus Casey, 1899, p. 142.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 160.—Wingo, 1952, pp. 28.—Gordon, 1976b, p. 78.

For detailed description, and discussion see Gordon, 1976b, p. 78.

Additional locality record: NEW JERSEY: Fort Lee.



Fig. 104. Distribution. *Scymnus (P.) kansanus*.

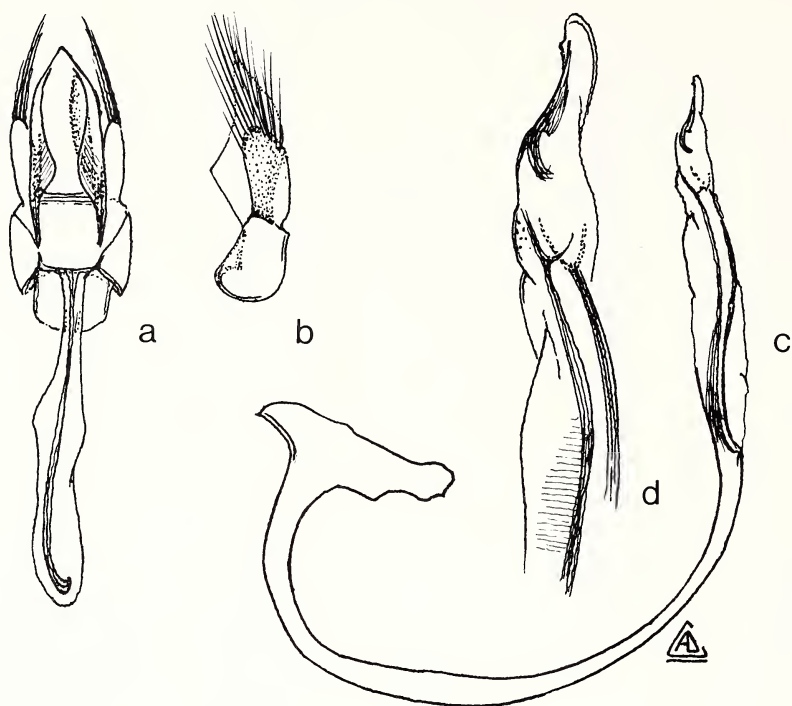


Fig. 105. *Scymnus (P.) pauculus*.

Scymnus (Pullus) pauculus Gordon

Fig. 105a-d; Map, Fig. 106

Scymnus (Pullus) pauculus Gordon, 1976b, p. 81.

For detailed description, and discussion see Gordon, 1976b, p. 81. *Additional locality record*. ARIZONA: Oracle.



Fig. 106. Distribution. *Scymnus* (*P.*) *pauculus* (star); *S. (P.) pallens* (dot).

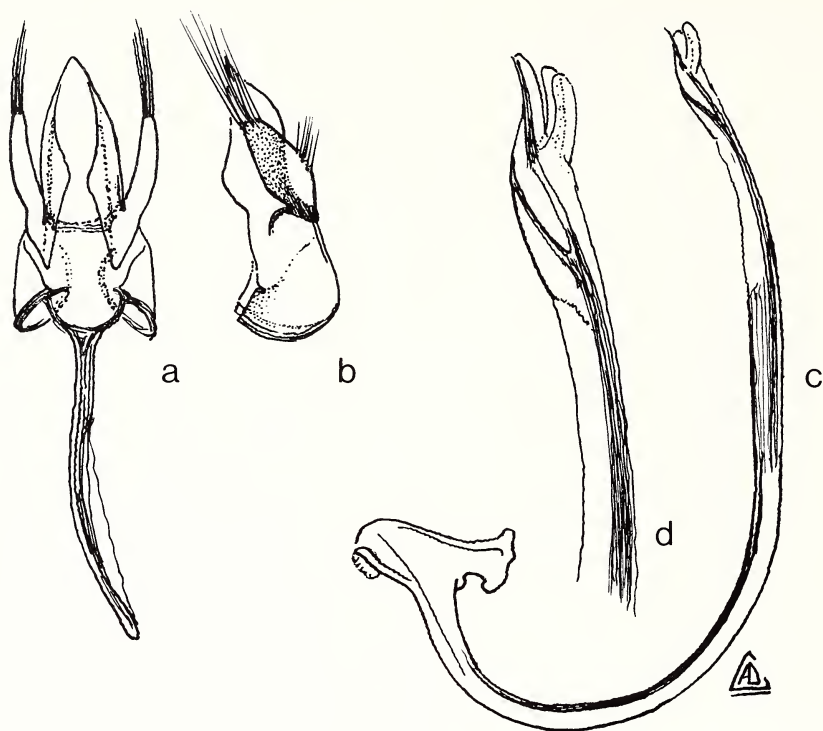


Fig. 107. *Scymnus (P.) pallens*.

Scymnus (Pullus) pallens LeConte

Fig. 107a-d; Map, Fig. 106

Scymnus pallens LeConte, 1852, p. 137.—Crotch, 1847b, p. 263.—Horn, 1895, p. 99.

Scymnus (Pullus) pallens: Casey, 1899, p. 140.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 164.—Hatch, 1961, p. 149.—Gordon, 1976b, p. 84.

For detailed description, and discussion see Gordon, 1976b, p. 84.

Additional locality record: TEXAS: Patricio Co., Martin, 12 mi. S.

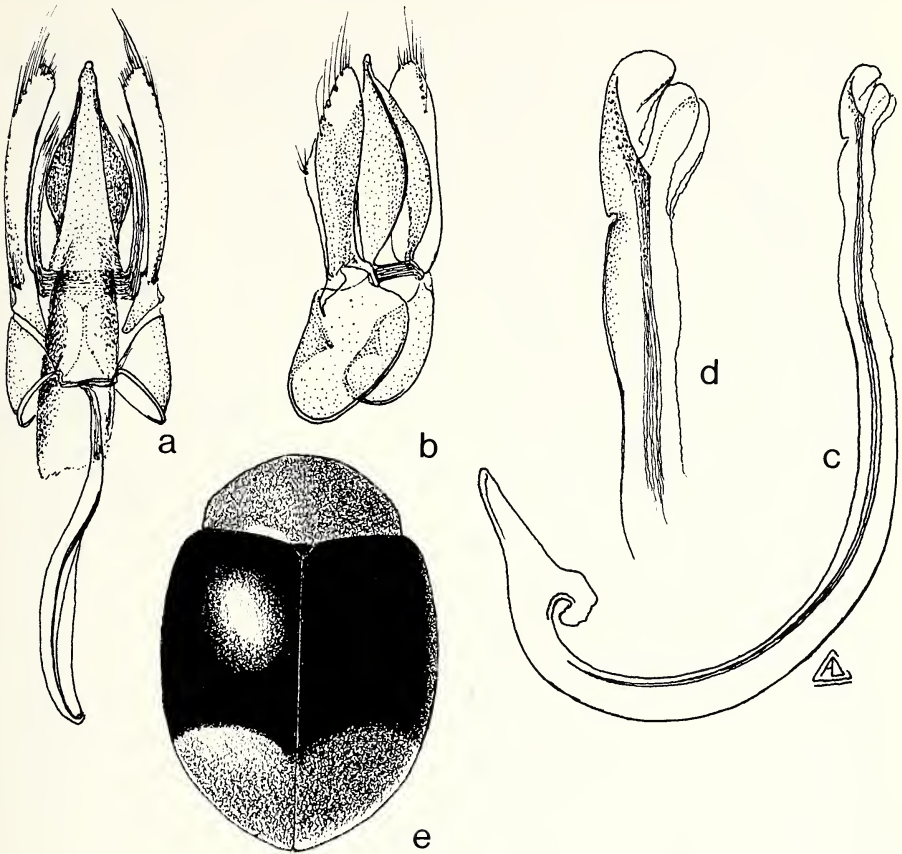


Fig. 108. *Scymnus (P.) semiruber*.

Scymnus (Pullus) semiruber Horn

Fig. 108a-e; Map, Fig. 109

Scymnus semiruber Horn, 1895, p. 102.

Scymnus (Pullus) semiruber: Casey, 1899, p. 140.—Leng, 1920, p. 213.—Wilson, 1927, p. 169.—Korschevsky, 1931, p. 165.—Gordon, 1976b, p. 86.

Scymnus puritanus Casey, 1924, p. 174.—Leng, 1927, p. 33.—Korschevsky, 1931, p. 165.—Gordon, 1976b, p. 86.

For detailed description and discussion see Gordon, 1976b, p. 86.

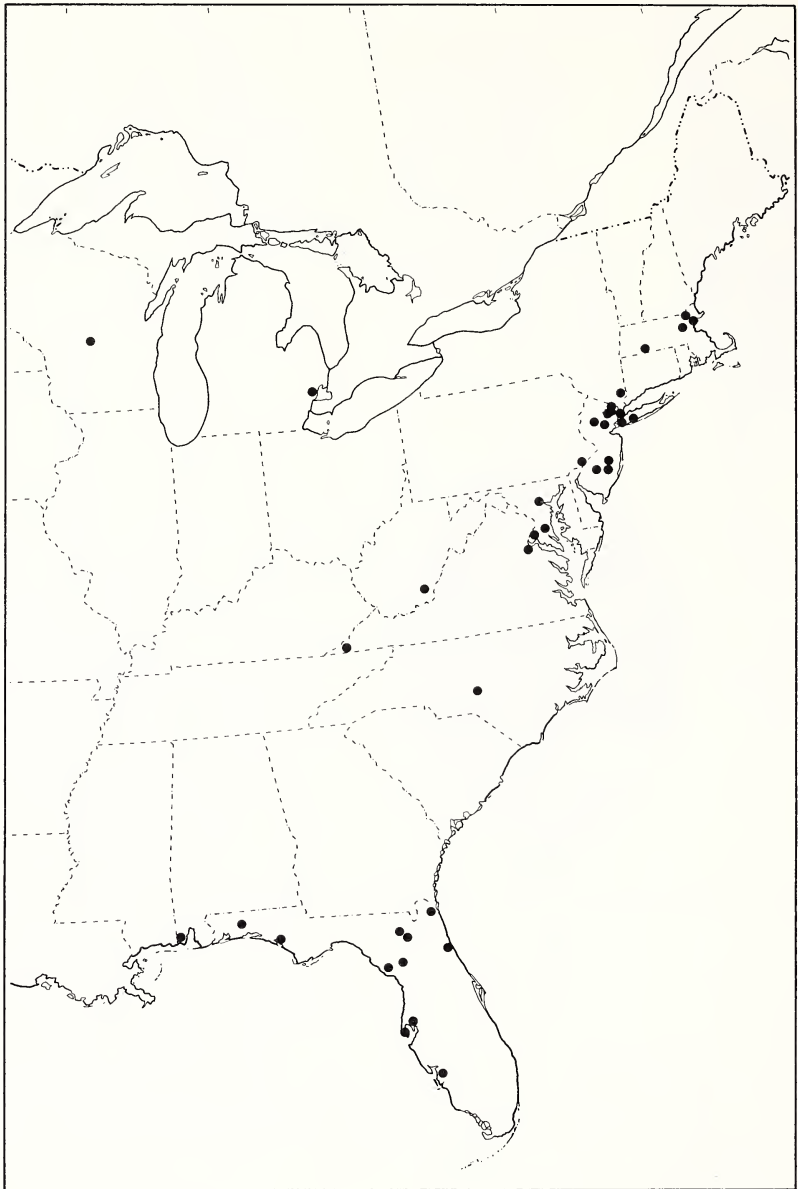


Fig. 109. Distribution. *Scymnus (P.) semiruber*.

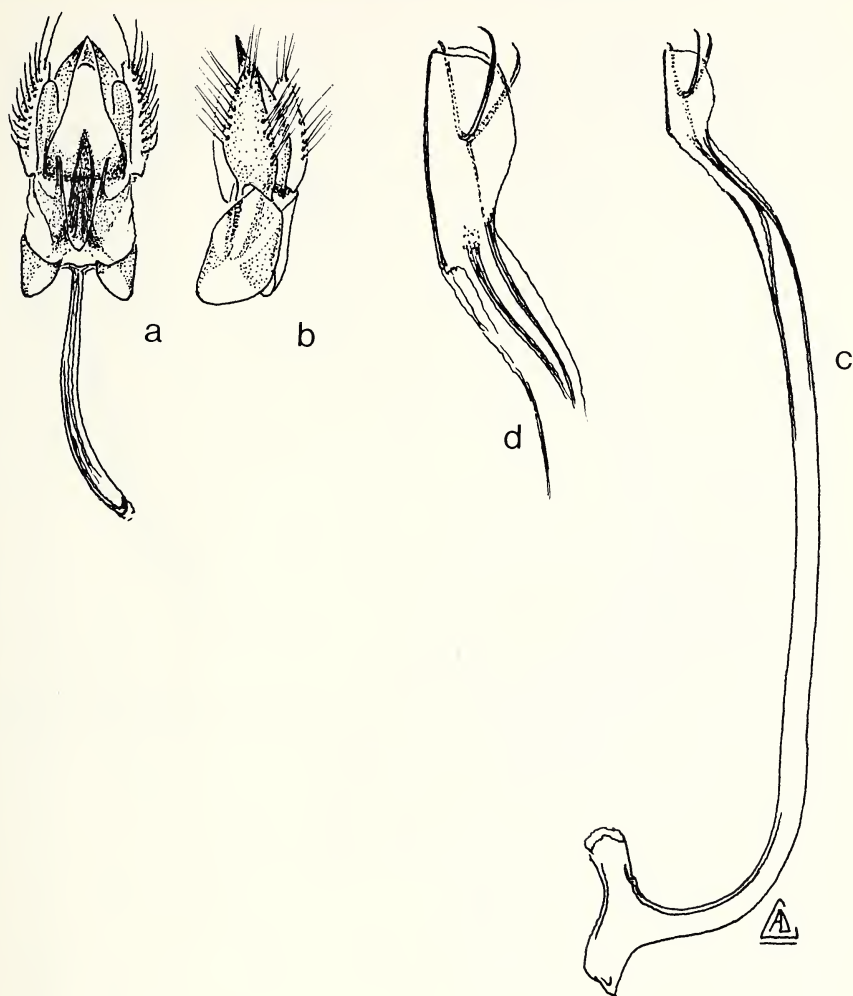


Fig. 110. *Scymnus (P.) gilae*.

Scymnus (Pullus) gilae Casey

Fig. 110a-d; Map, Fig. 111

Scymnus (Pullus) gilae Casey, 1899, p. 147.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 159.—Gordon, 1976b, p. 89.

Scymnus (Pullus) infans Casey, 1899, p. 149.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 160.—Gordon, 1976b, p. 89.

Scymnus apiciventris Casey, 1924, p. 175.—Leng and Mutchler, 1927, p. 33.—Korschefsky, 1931, p. 154.—Gordon, 1976b, p. 91.

For detailed description, and discussion see Gordon, 1976b, p. 89.

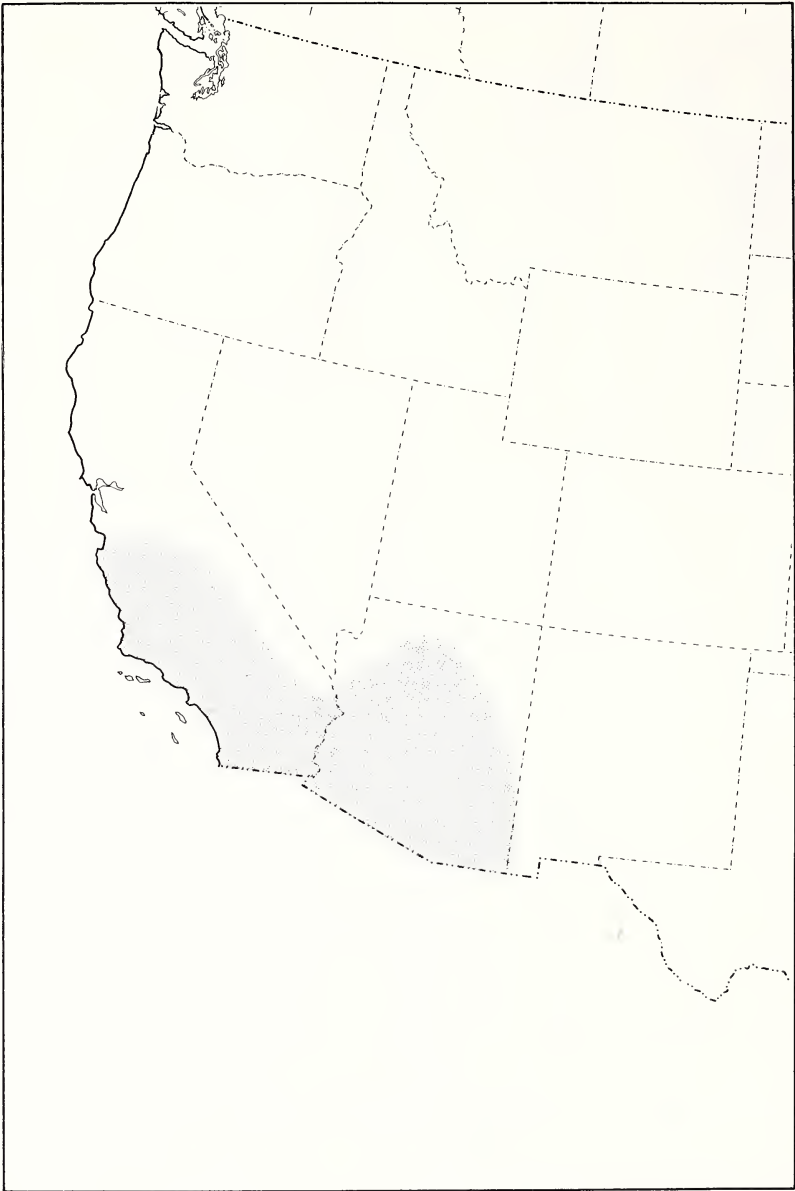


Fig. 111. Distribution. *Scymnus (P.) gilae*.

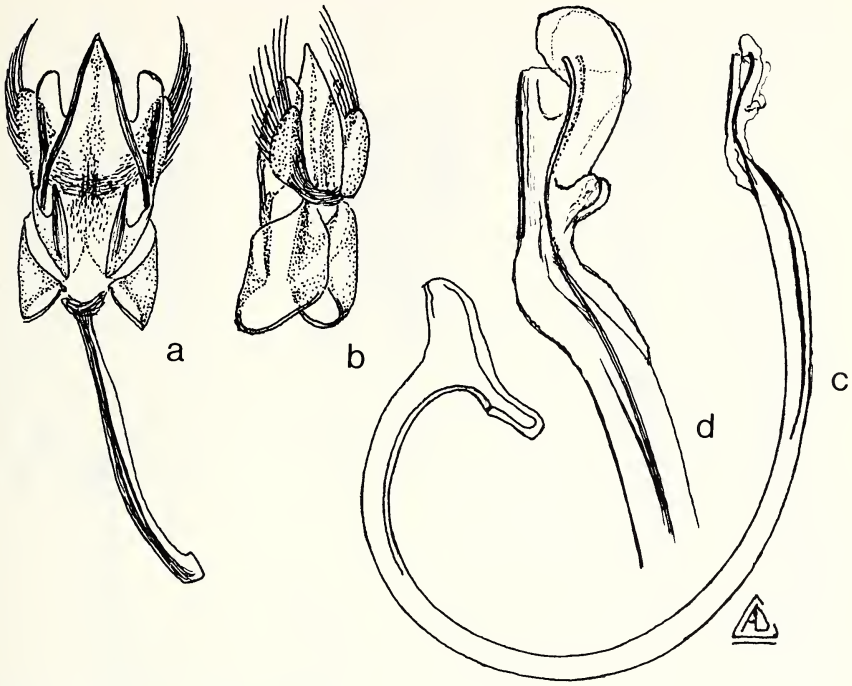


Fig. 112. *Scymnus (P.) mimoides*.

Scymnus (Pullus) mimoides Gordon
Fig. 112a-d; Map, Fig. 113

Scymnus (Pullus) mimoides Gordon, 1976b, p. 93.

For detailed description and discussion see Gordon, 1976b, p. 93.

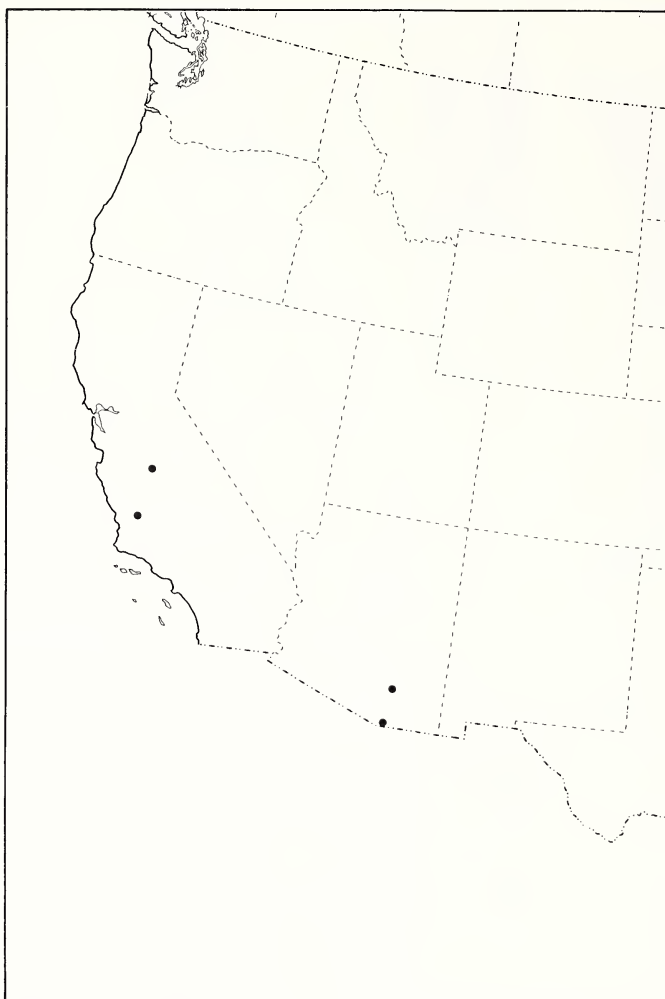


Fig. 113. Distribution. *Scymnus (P.) mimoides*.

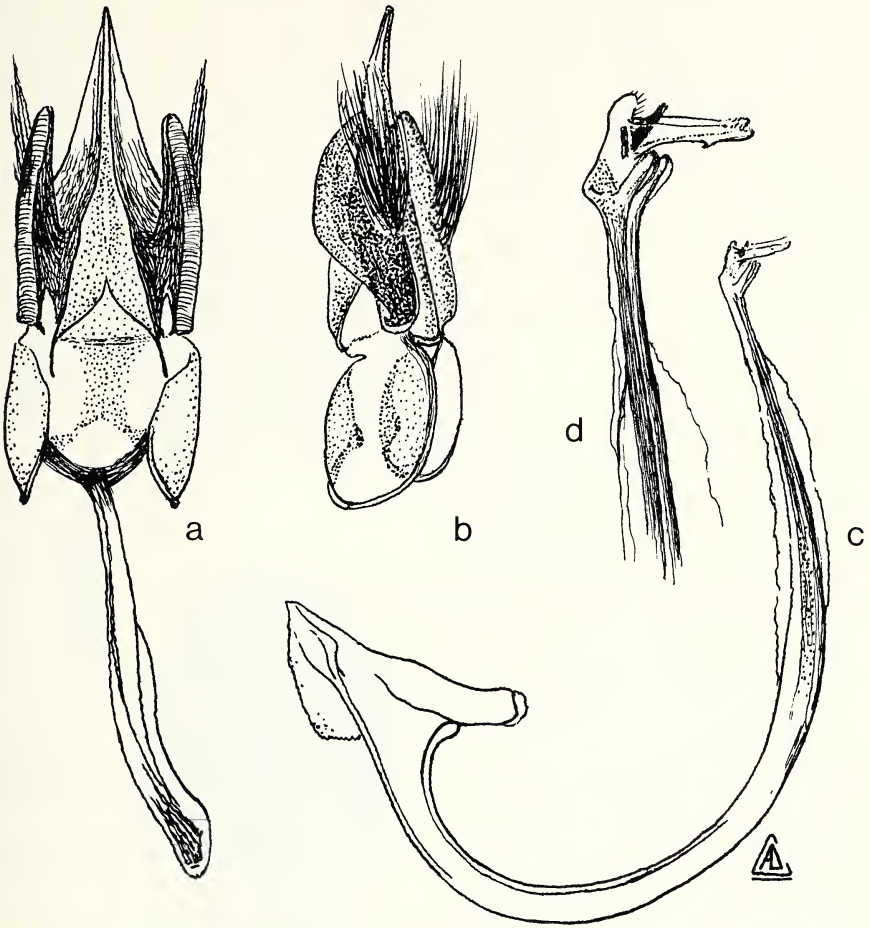


Fig. 114. *Scymnus* (*P.*) *cervicalis*.

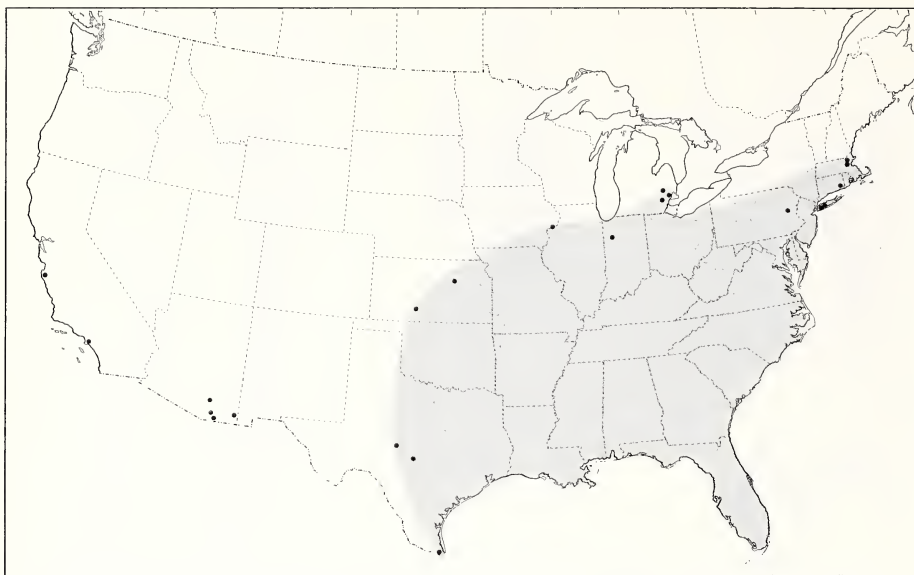


Fig. 115. Distribution. *Scymnus (P.) cervicalis* (disjunct localities dotted).

Scymnus (Pullus) cervicalis Mulsant

Fig. 114a-d; Map, Fig. 115

Scymnus (Pullus) cervicalis Mulsant, 1850, p. 984.—Casey, 1899, p. 142.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 156.—Wingo, 1952, p. 29.—J. Chapin, 1974, p. 28.—Gordon, 1976b, p. 95.

Scymnus cervicalis: LeConte, 1852, p. 139.—Crotch, 1874b, p. 266.—Horn, 1895, p. 103.—Wilson, 1927, p. 169.

For detailed description, and discussion see Gordon, 1976b, p. 95.

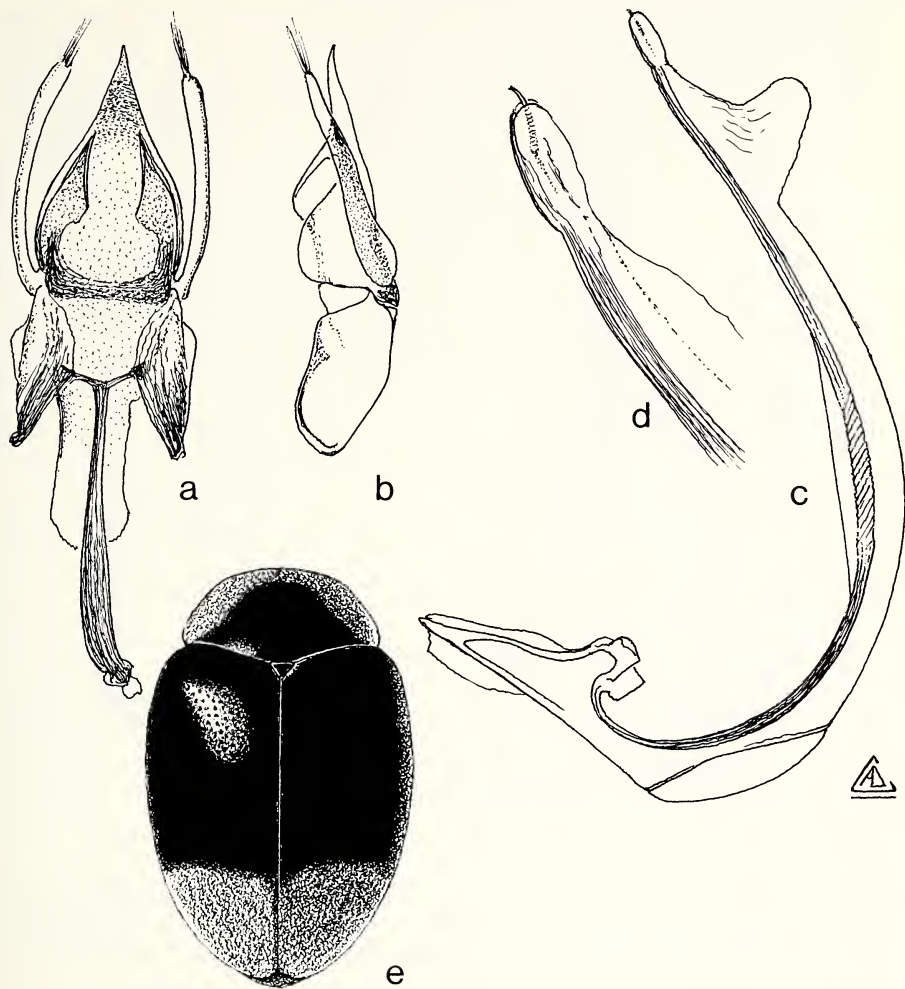


Fig. 116. *Scymnus* (*P.*) *rubricaudus*.

Scymnus (*Pullus*) *rubricaudus* Casey

Fig. 116a-e; Map, Fig. 117

Scymnus (*Pullus*) *rubricauda* Casey, 1899, p. 141.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 165.

Scymnus (*Pullus*) *texanus* Casey, 1899, p. 141.—Leng, 1920, p. 213 (synonym of *creperus* Mulsant).—Korschefsky, 1931, p. 157.—Wingo, 1952, p. 32.

Scymnus (*Pullus*) *chromopyga* Casey, 1899, p. 141.—Leng, 1920, p. 213.—Wingo, 1952, p. 32.

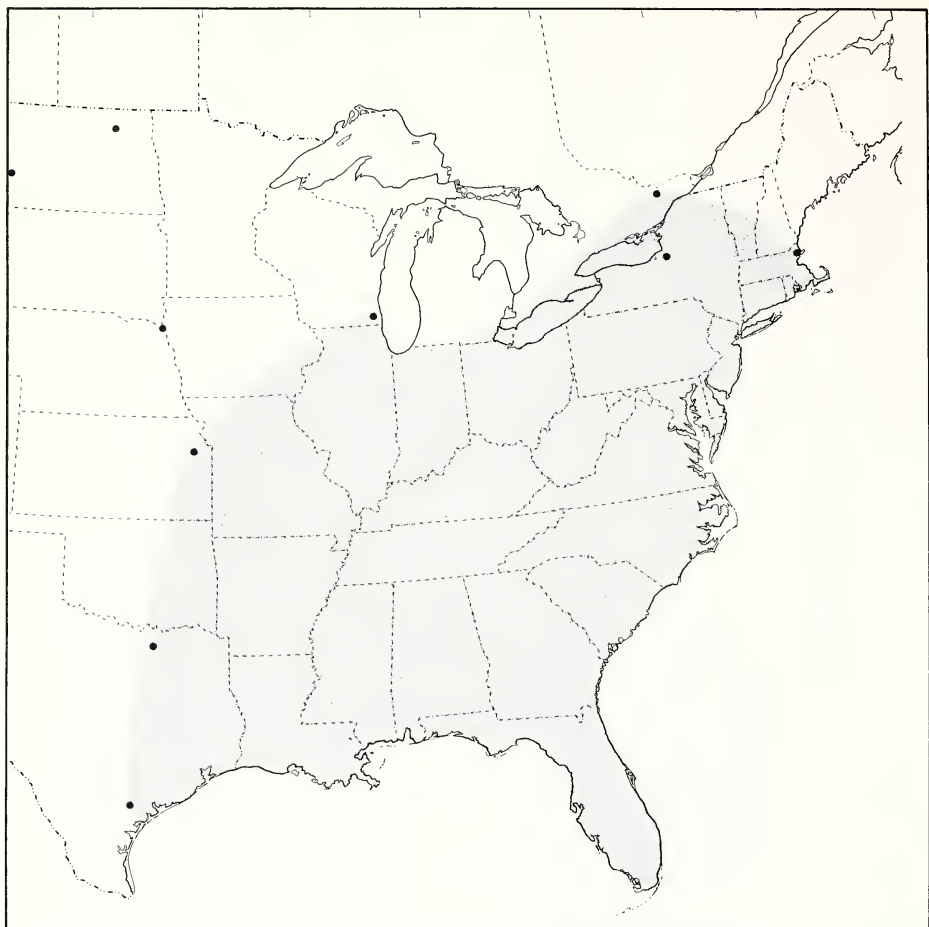


Fig. 117. Distribution. *Scymnus (P.) rubricaudus* (peripheral and disjunct localities dotted).

Scymnus (Pullus) canterius Casey, 1899, p. 142.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 156.—Gordon, 1976b, p. 100.

Scymnus (Pullus) rubricaudus: Wingo, 1952, p. 32.—J. Chapin, 1974, p. 25.—Gordon, 1976b, p. 98.

Scymnus (Pullus) chromopygus: Korschefsky, 1931, p. 156.

For detailed synonymy, description, and discussion see Gordon, 1976b, p. 98.

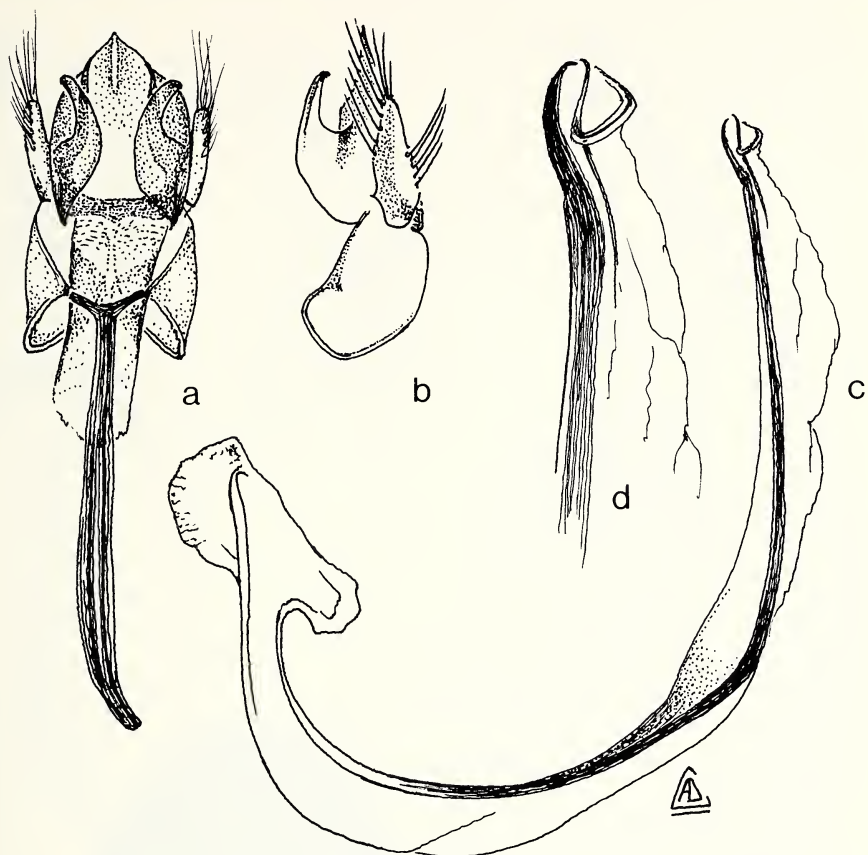


Fig. 118. *Scymnus (P.) enochrus*.

Scymnus (Pullus) enochrus Gordon
Fig. 118a-d; Map, Fig. 119

Scymnus (Pullus) enochrus Gordon, 1976b, p. 102.

For detailed description, and discussion see Gordon, 1976b, p. 102.



Fig. 119. Distribution. *Scymnus (P.) enochrus*.

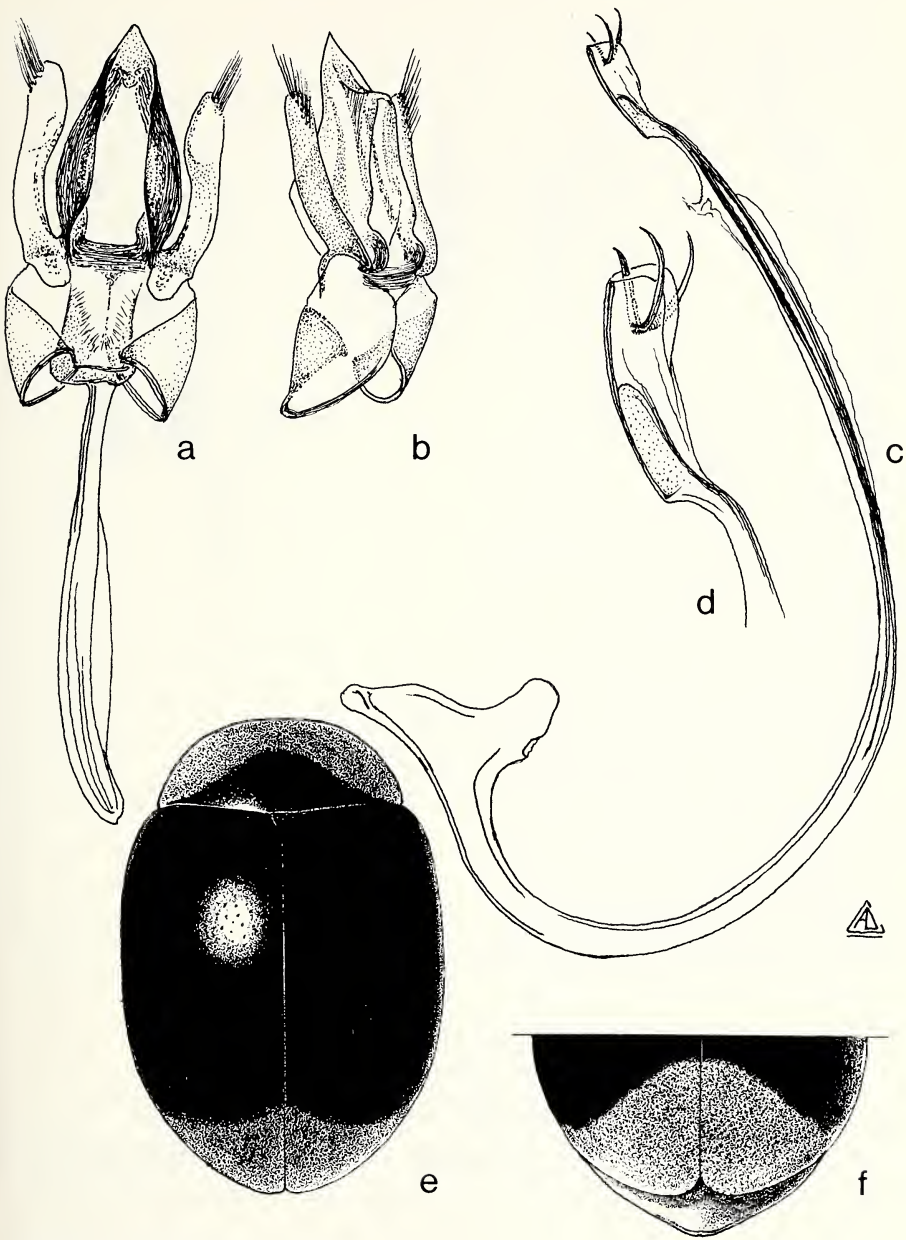


Fig. 120. *Scymnus (P.) festatus*.

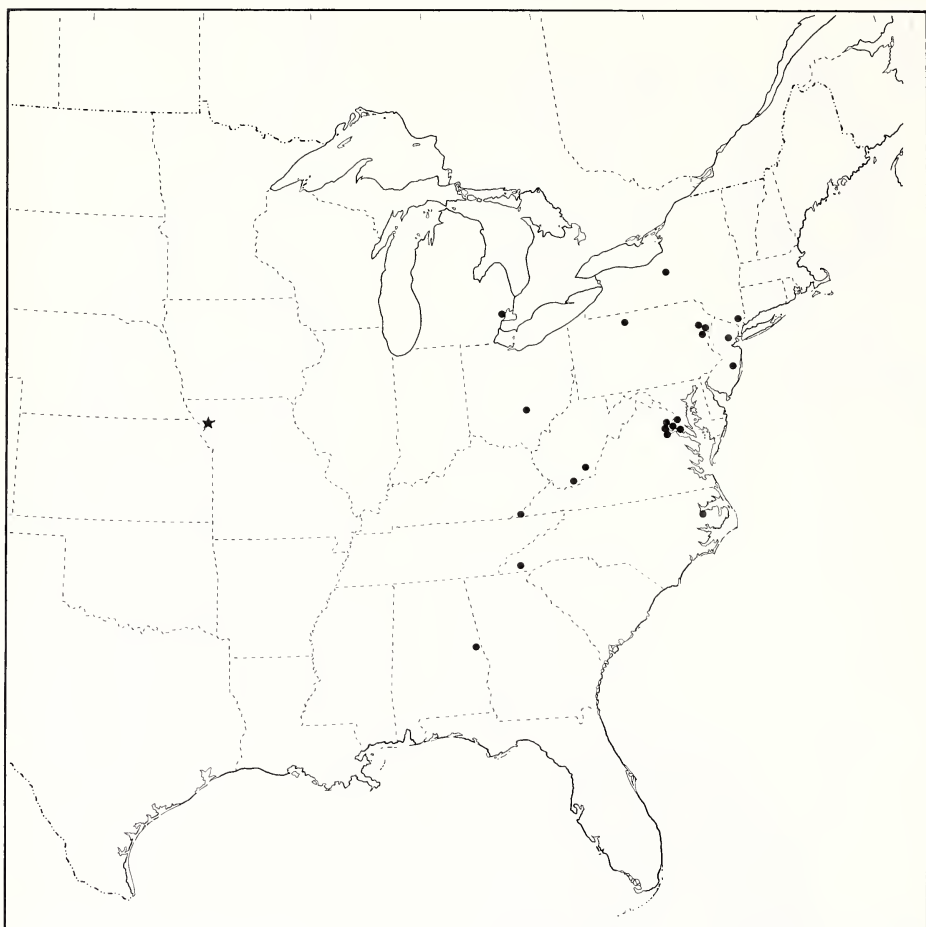


Fig. 121. Distribution. *Scymnus (P.) festatus* (dot); *pulvinatus* (star).

Scymnus (Pullus) festatus Wingo

Fig. 120a-f; Map, Fig. 121

Scymnus (Pullus) festatus Wingo, 1952, p. 31.—Gordon, 1976b, p. 103.

For detailed description, and discussion see Gordon, 1976b, p. 103.

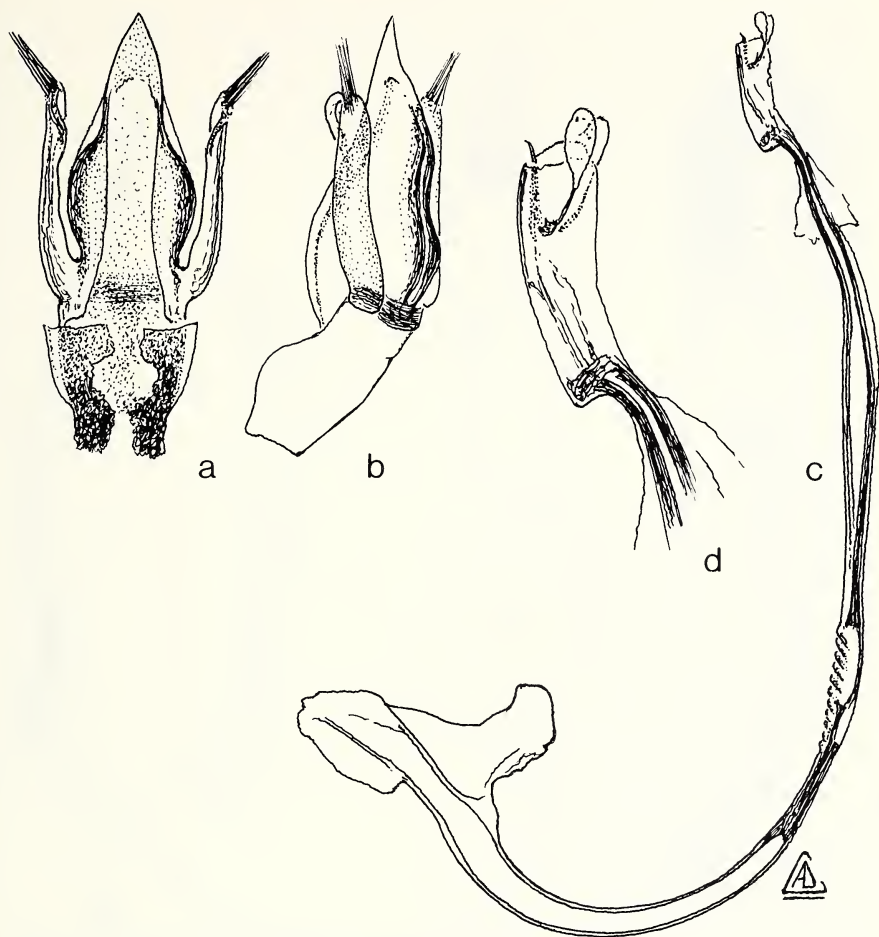


Fig. 122. *Scymnus* (*P.*) *pulvinatus*.

Scymnus (*Pullus*) *pulvinatus* Wingo

Fig. 122a-d; Map, Fig. 121

Scymnus (*Pullus*) *pulvinatus* Wingo, 1952, p. 34.—Gordon, 1976b, p. 106.

For detailed description, and discussion see Gordon, 1976b, p. 106.

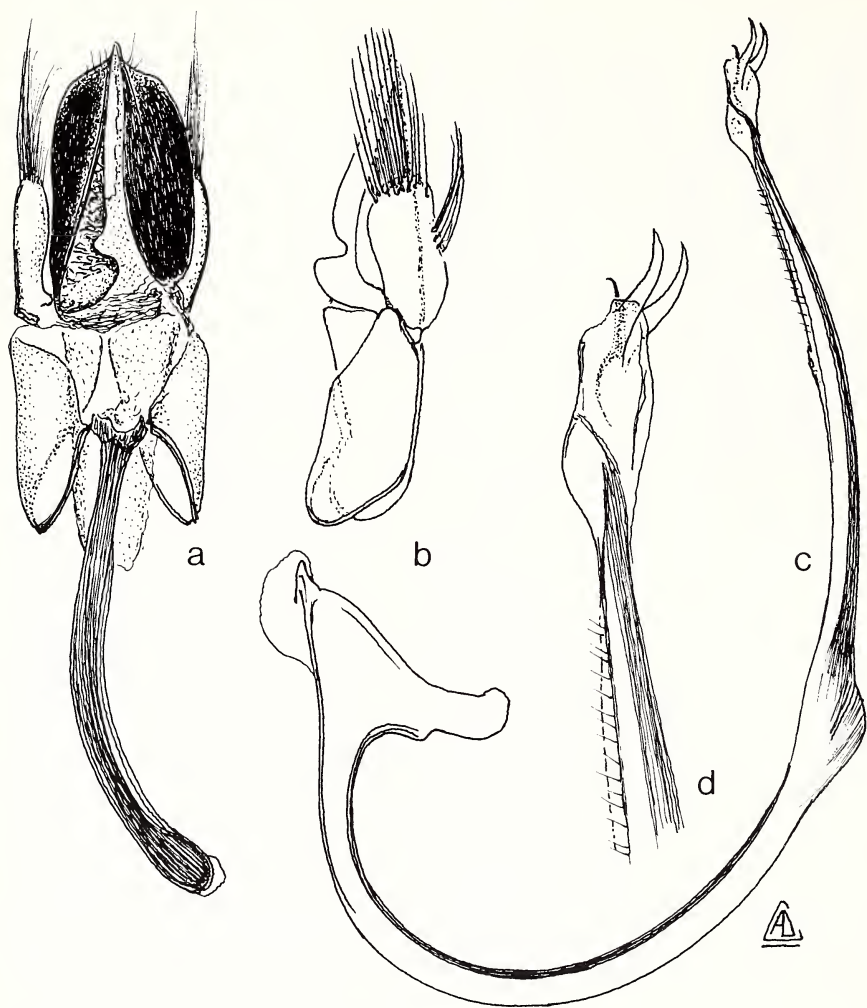


Fig. 123. *Scymnus* (P.) *nemorivagus*.

Scymnus (Pullus) *nemorivagus* Wingo

Fig. 123a-d; Map, Fig. 124

Scymnus (Pullus) *nemorivagus* Wingo, 1952, p. 35.—Gordon, 1976b, p. 109.

For detailed description, and discussion see Gordon, 1976b, p. 109.



Fig. 124. Distribution. *Scymnus* (*P.*) *nemorivagus*.

Scymnus (*Pullus*) *fraternus* LeConte

Fig. 125a-f, Map, Fig. 126

Scymnus fraternus LeConte, 1852, p. 138.—Crotch, 1874b, p. 264.—Horn, 1895, p. 101.—Stehr, 1930, p. 49.—Wingo, 1952, p. 31.—Chapin, 1973, p. 1072.

Scymnus haemorrhous LeConte, 1852, p. 138.—Crotch, 1874b, p. 264.—Horn, 1895, p. 101.

Scymnus (*Pullus*) *creperus* var. *fraternus*: Casey, 1899, p. 140.—Leng, 1920, p. 213.

Scymnus (*Pullus*) *haemorrhous*: Casey, 1899, p. 140.—Leng, 1920, p. 213.—Wilson, 1927, p. 170.—Korschefsky, 1931, p. 159.

Scymnus dentipes Fall, 1901, p. 234.—Fall, 1904, p. 176.

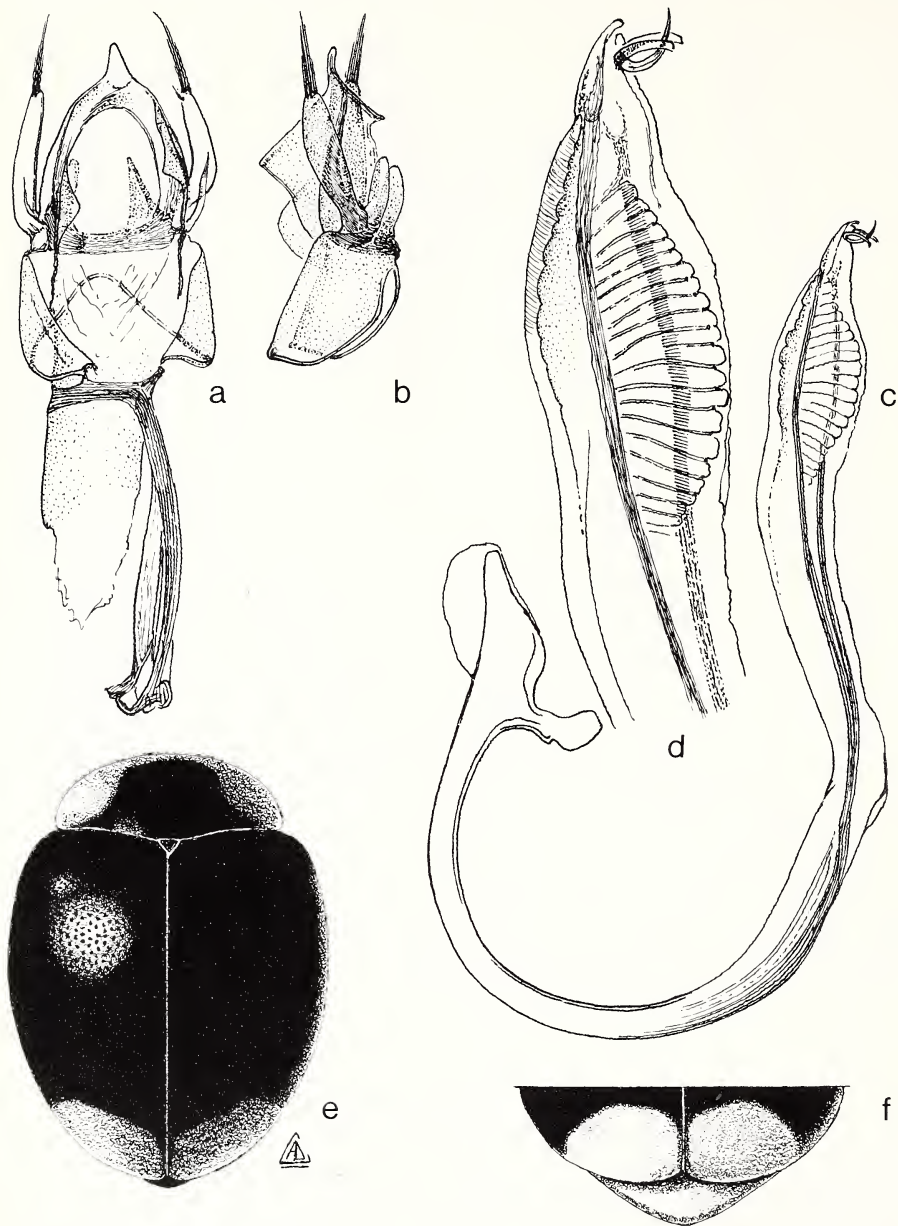


Fig. 125. *Scymnus (P.) fraternus*.



Fig. 126. Distribution. *Scymnus (P.) fraternus* (peripheral and disjunct localities dotted).

Scymnus (Pullus) fraternus: Wingo, 1952, p. 31.—J. Chapin, 1973, p. 1071.— J. Chapin, 1974, p. 24.—Gordon, 1976b, p. 109.

For detailed description, and discussion see Gordon, 1976b, p. 109.

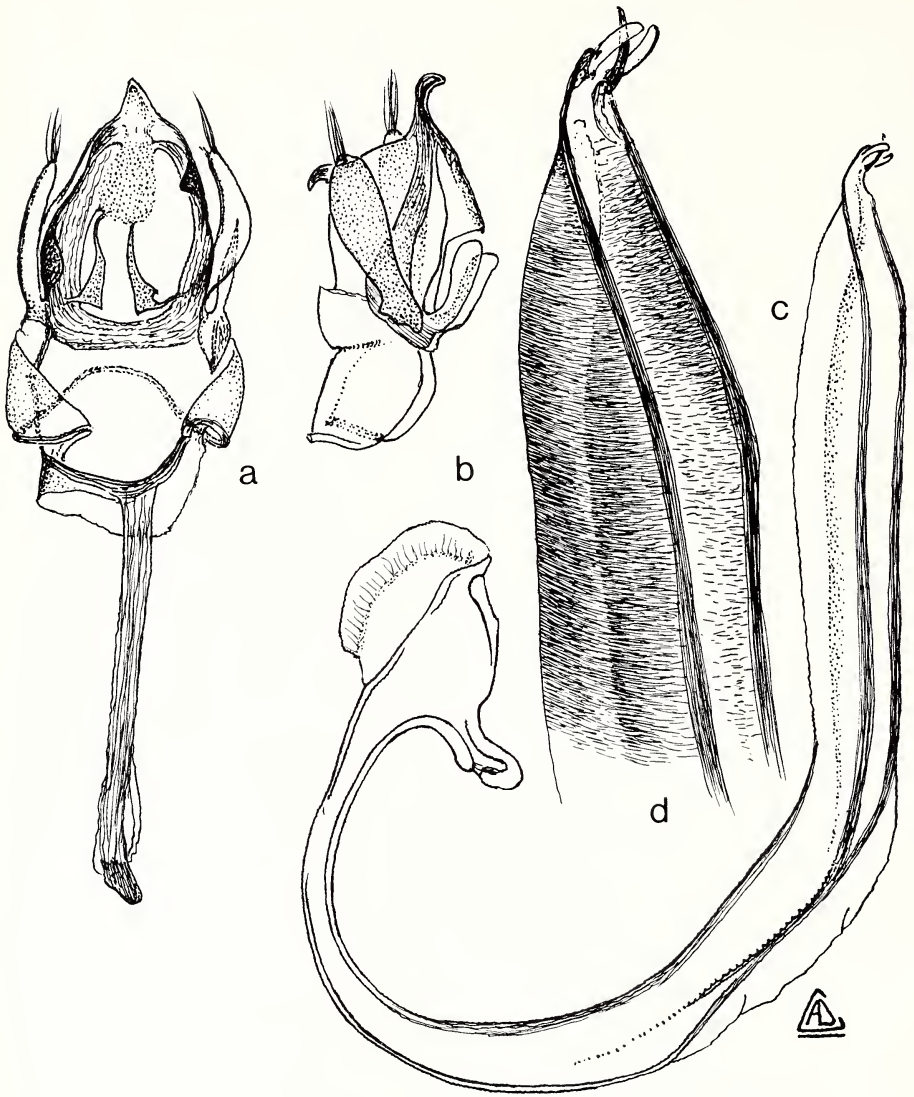


Fig. 127. *Scymnus (P.) louisianae*.

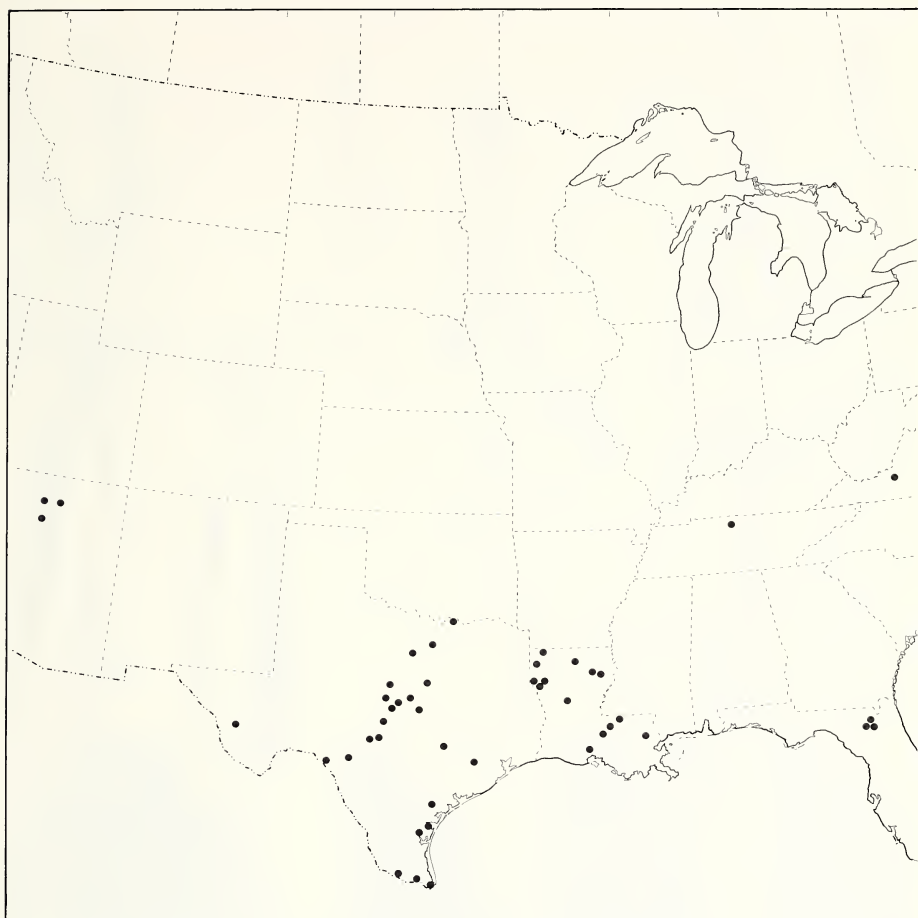


Fig. 128. Distribution. *Scymnus (P.) louisianae*.

Scymnus (Pullus) louisianae J. Chapin
Fig. 127a–d; Map, Fig. 128

Scymnus (Pullus) louisianae J. Chapin, 1973, p. 1071.—J. Chapin, 1974, p. 24.—
Gordon, 1976b, p. 115.

For detailed description, and discussion see Gordon, 1976b, p. 115.
Additional locality record: TEXAS: Hidalgo Co., MacAllen.

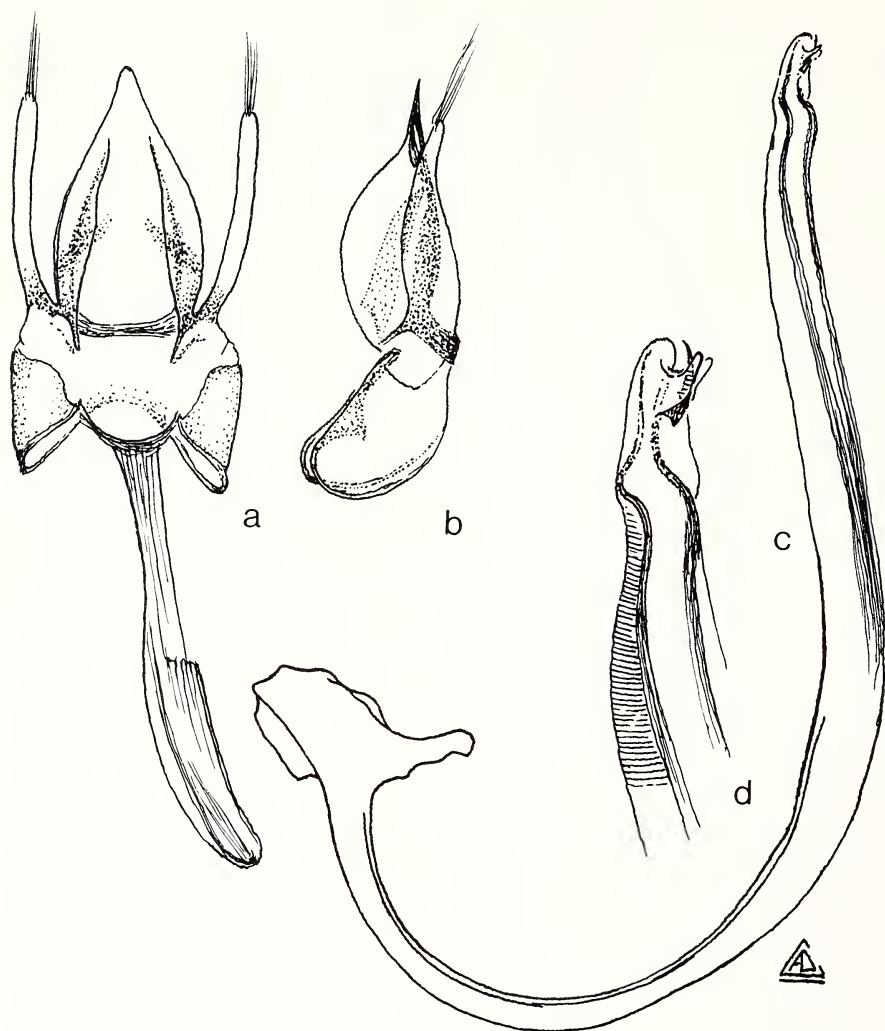


Fig. 129. *Scymnus (P.) apithanus*.

Scymnus (Pullus) apithanus Gordon

Fig. 129a-d; Map, Fig. 132

Scymnus (Pullus) apithanus Gordon, 1976b, p. 118.

For detailed description, and discussion see Gordon, 1976b, p. 118.

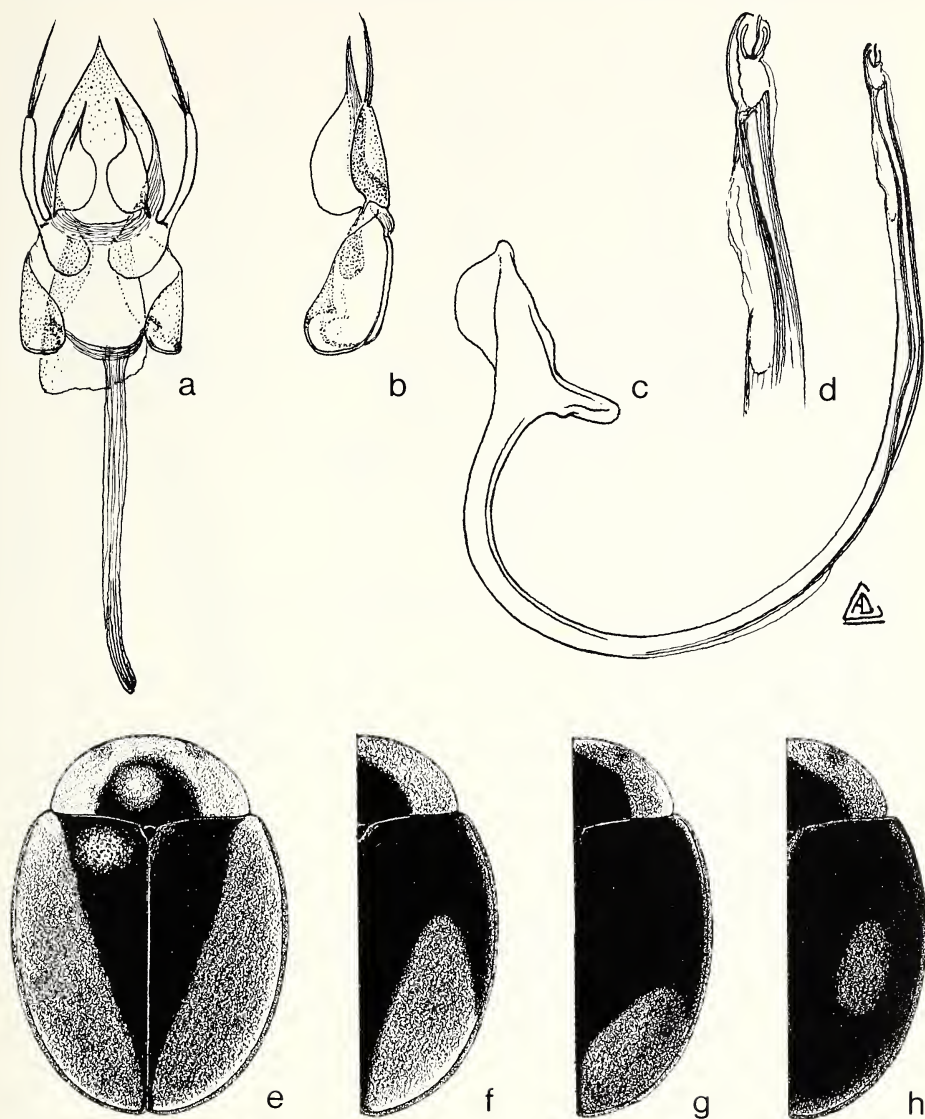


Fig. 130. *Scymnus (P.) loewii*.

Scymnus (Pullus) loewii Mulsant

Fig. 130a-h; Map, Fig. 131

Scymnus (Pullus) loewii Mulsant, 1850, p. 908.—Gorham, 1897, p. 227.—Korschefsky, 1931, p. 161.—Leng and Mutchler, 1933, p. 87.—J. Chapin, 1974, p. 27.—Gordon, 1976b, p. 119.

Scymnus loewii: Crotch, 1874b, p. 271.

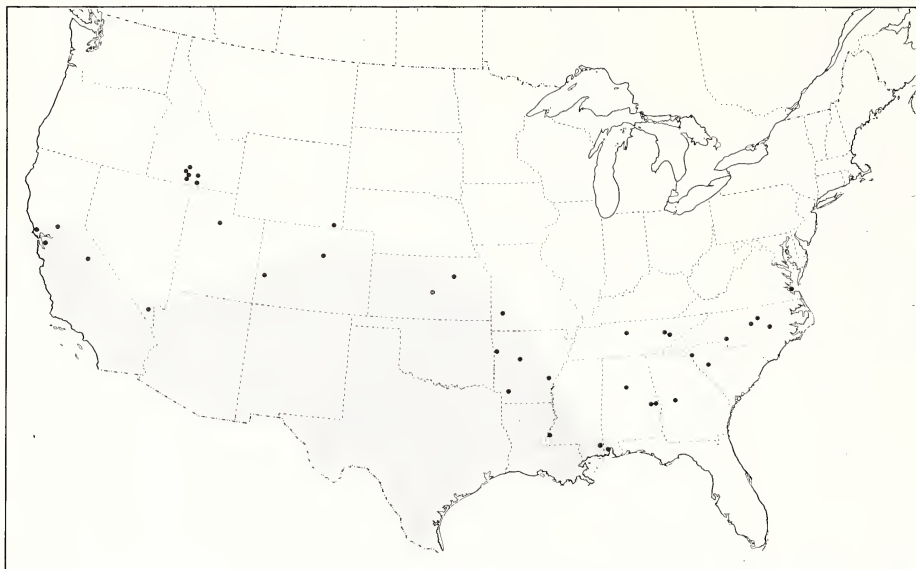


Fig.. 131. Distribution. *Scymnus* (*P.*) *loewii* (peripheral localities dotted).

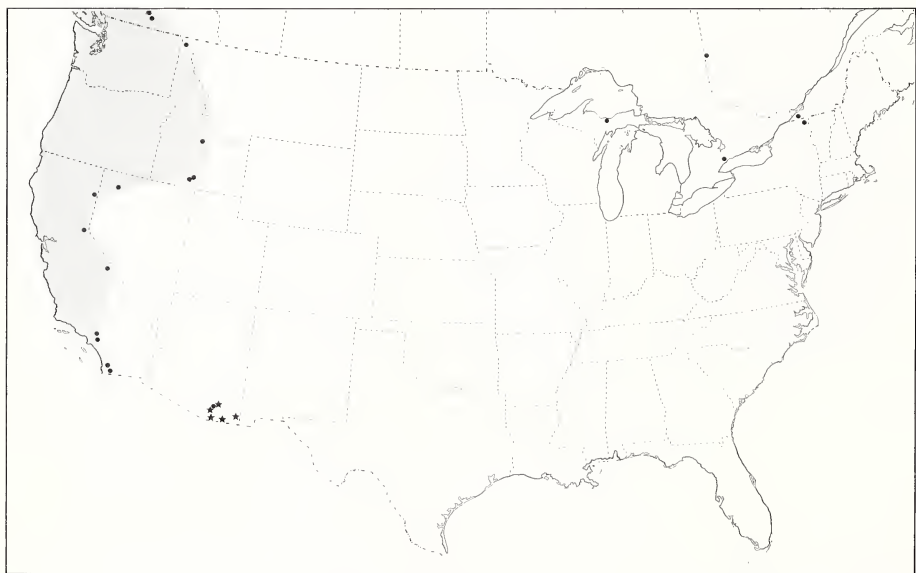


Fig. 132. Distribution. *Scymnus* (*P.*) *apithanus* (star); *S.* (*P.*) *marginicollis* (shaded, peripheral and disjunct localities dotted).

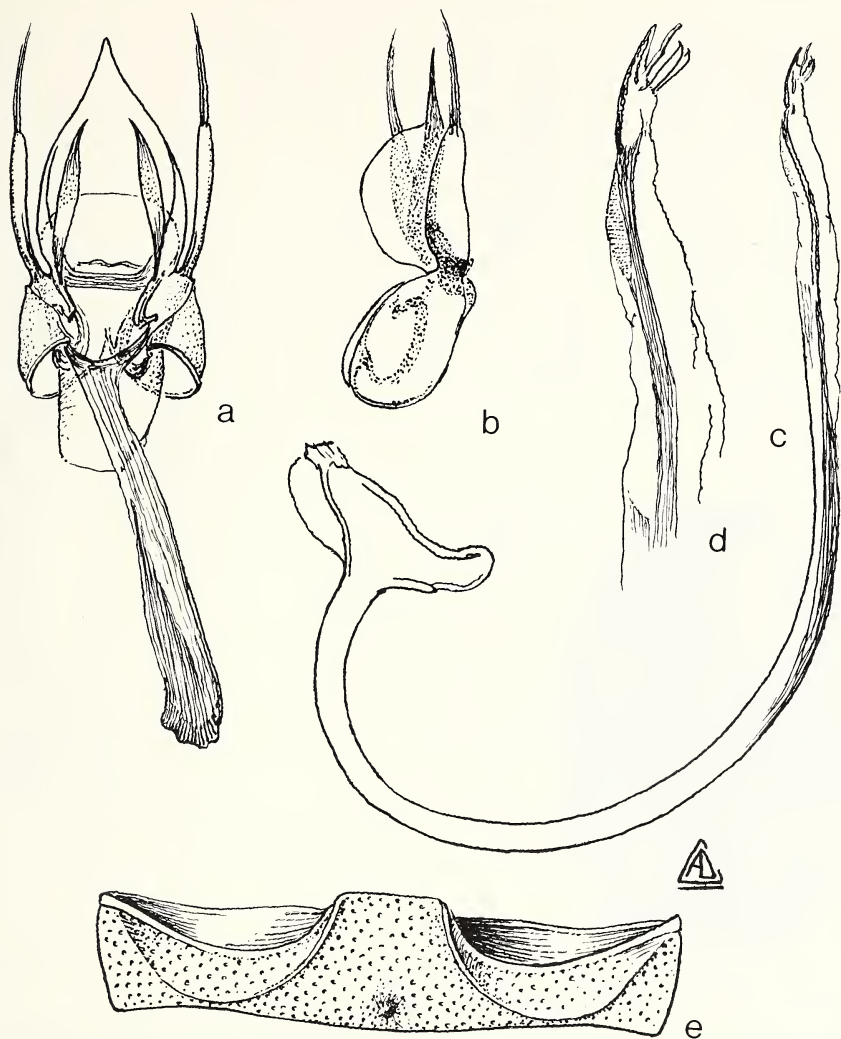


Fig. 133. *Scymnus* (*P.*) *marginicollis*.

Scymnus cinctus LeConte, 1852, p. 137.—Crotch, 1874b, p. 263.—Horn, 1895, p. 99.
Scymnus (*Pullus*) *cinctus*: Gorham, 1897, p. 227.—Casey, 1899, p. 152.—Wilson, 1927, p. 169.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 156.—Wingo, 1952, p. 30.

Scymnus suturalis LeConte, 1852, p. 138 (not Thunberg, 1795).—Crotch, 1874b, p. 264.

Scymnus lecontei Crotch, 1874b, p. 264.—Horn, 1895, p. 99.

Scymnus (*Pullus*) *lecontei*: Gorham, 1897, p. 227.—Casey, 1899, p. 152.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 161.

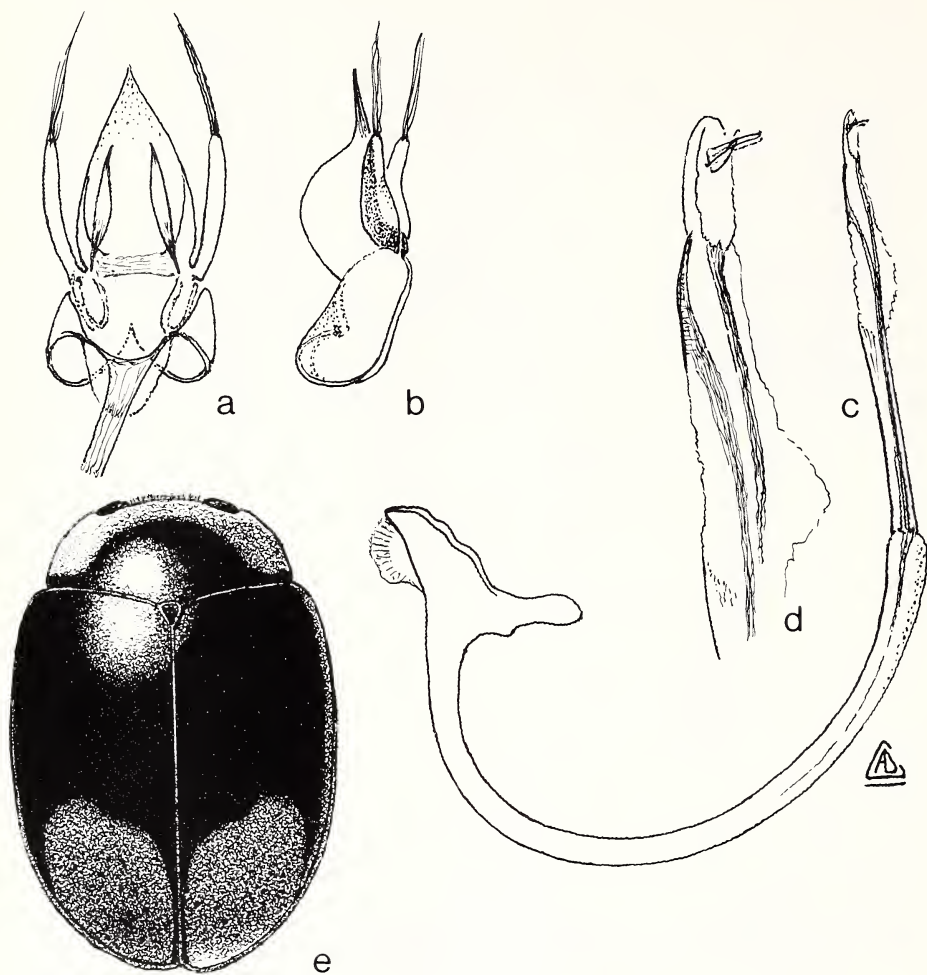


Fig. 134. *Scymnus (P.) postpictus*.

Scymnus flebilis Horn, 1895, p. 100.

Scymnus (Pullus) flebilis: Casey, 1899, p. 160.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 158.—Gordon, 1976b, p. 120.

Scymnus (Pullus) sarpedon Casey, 1899, p. 152.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 165.—Gordon, 1976b, p. 120.

Scymnus (Pullus) nubes Casey, 1899, p. 151.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 163.—Gordon, 1976b, p. 120.

Scymnus scotti Nunenmacher, 1934, p. 17.—Gordon, 1976b, p. 120.

For detailed description, and discussion see Gordon, 1976b, p. 119.

Additional locality record: TEXAS: Garza Co.; 2 mi. N. Justiceburg.

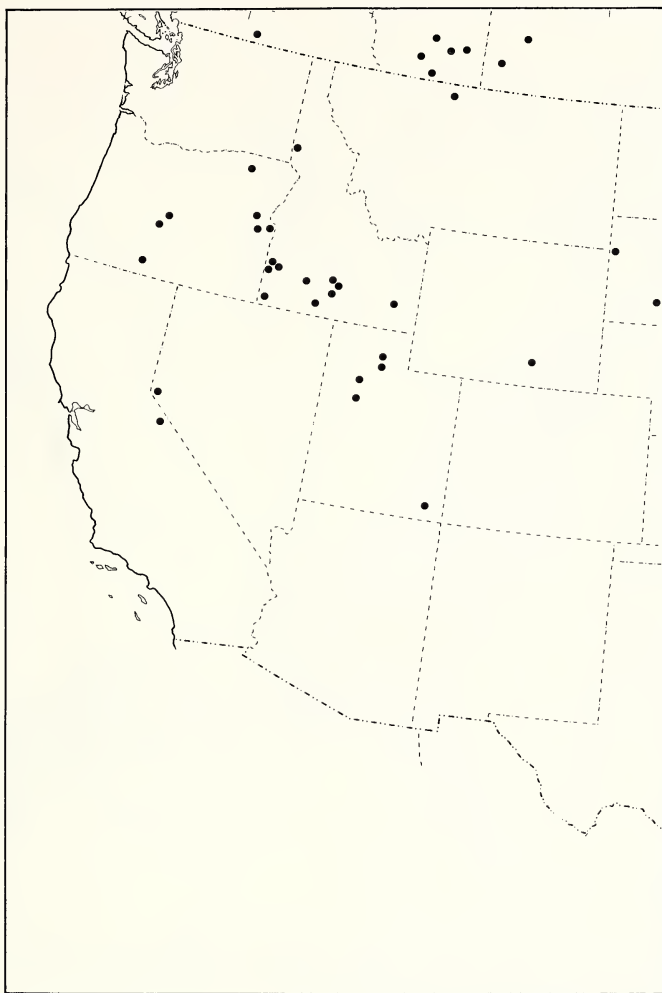


Fig. 135. Distribution. *Scymnus (P.) postpictus*.

Scymnus (Pullus) marginicollis Mannerheim

Fig. 133a-e; Map, Fig. 132

Scymnus marginicollis Mannerheim, 1843, p. 313.—Mulsant, 1850, p. 1053.—LeConte, 1852, p. 140.—Crotch, 1874b, p. 267.—Horn, 1895, p. 104.

Scymnus (Pullus) marginicollis: Casey, 1899, p. 142.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 161.—Wingo, 1952, p. 34.—Hatch, 1961, p. 150.—Gordon, 1976b, p. 125.—Belicek, 1976, p. 304.

Scymnus californicus Boheman, 1859, p. 207.

Scymnus (Pullus) californicus: Casey, 1899, p. 142.—Leng, 1920, p. 213.

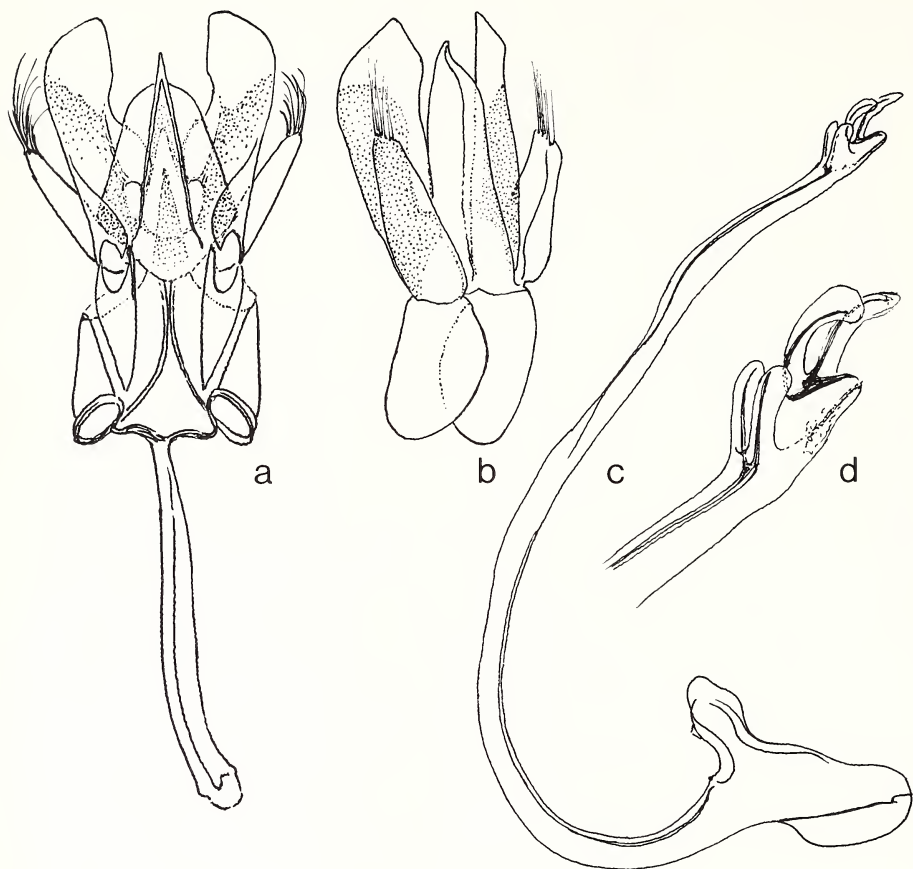


Fig. 136. *Scymnus (P.) socer*.

Scymnus (Pullus) desertorum Casey, 1899, p. 145.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 157.—Gordon, 1976b, p. 125.

Scymnus (Pullus) marginicollis borealis Hatch, 1961, p. 150.—Gordon, 1976b, p. 125.

For detailed description, and discussion see Gordon, 1976b, p. 125.

Scymnus (Pullus) postpictus Casey

Fig. 134a-e; Map, Fig. 135

Scymnus (Pullus) postpinctus Casey, 1899, p. 141 (lapsus).—Korschefsky, 1931, p. 164.

Scymnus (Pullus) postpictus Casey, 1908, p. 405 (emendation).—Leng, 1920, p. 213.—Gordon, 1976b, p. 130.—Belicek, 1976, p. 304.

For detailed synonymy, description, and discussion see Gordon, 1976b, p. 130.

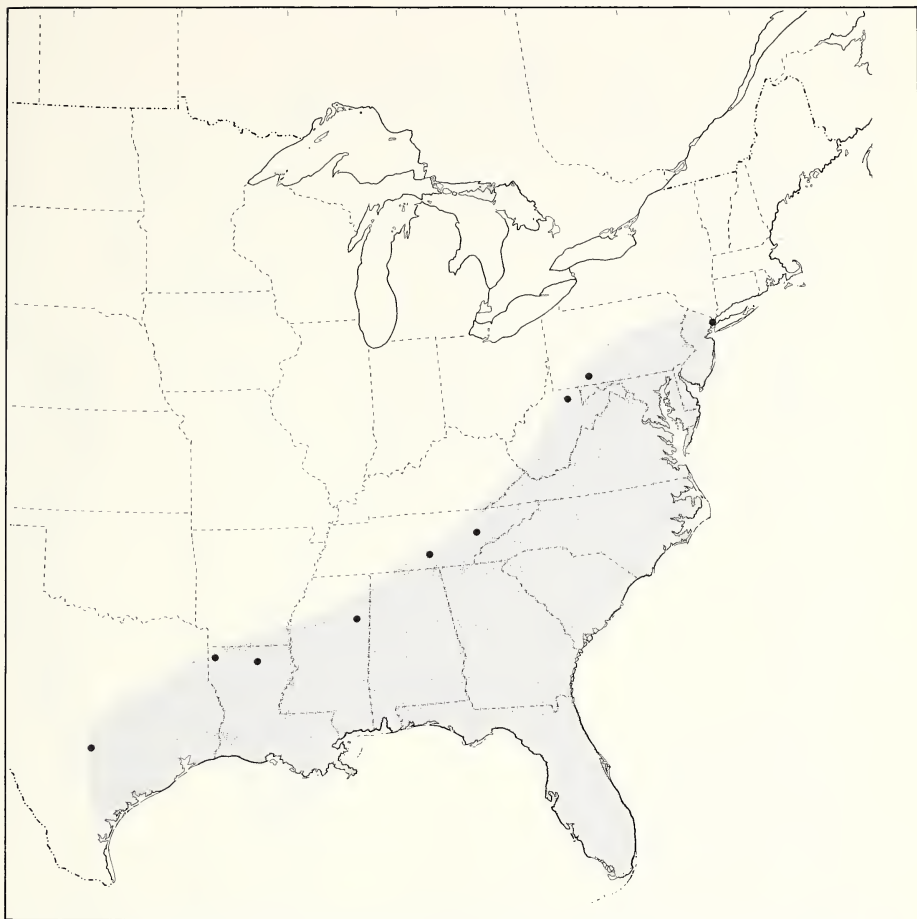


Fig. 137. Distribution. *Scymnus (P.) socer*.

Scymnus (Pullus) socer LeConte

Fig. 136a-d; Map, Fig. 137

Scymnus socer LeConte, 1852, p. 139.—Crotch, 1874b, p. 267.—Horn, 1895, p. 103.

Scymnus (Pullus) socer: Casey, 1899, p. 144.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 166.—J. Chapin, 1974, p. 29.—Gordon, 1976b, p. 133.

Scymnus (Pullus) kinzeli Casey, 1899, p. 143.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 160 (*kinzelii*).—J. Chapin, 1974, p. 30.

Scymnus (Pullus) innocens Casey, 1899, p. 145.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 160.—Gordon, 1976b, p. 133.

For detailed description, and discussion see Gordon, 1976b, p. 133.

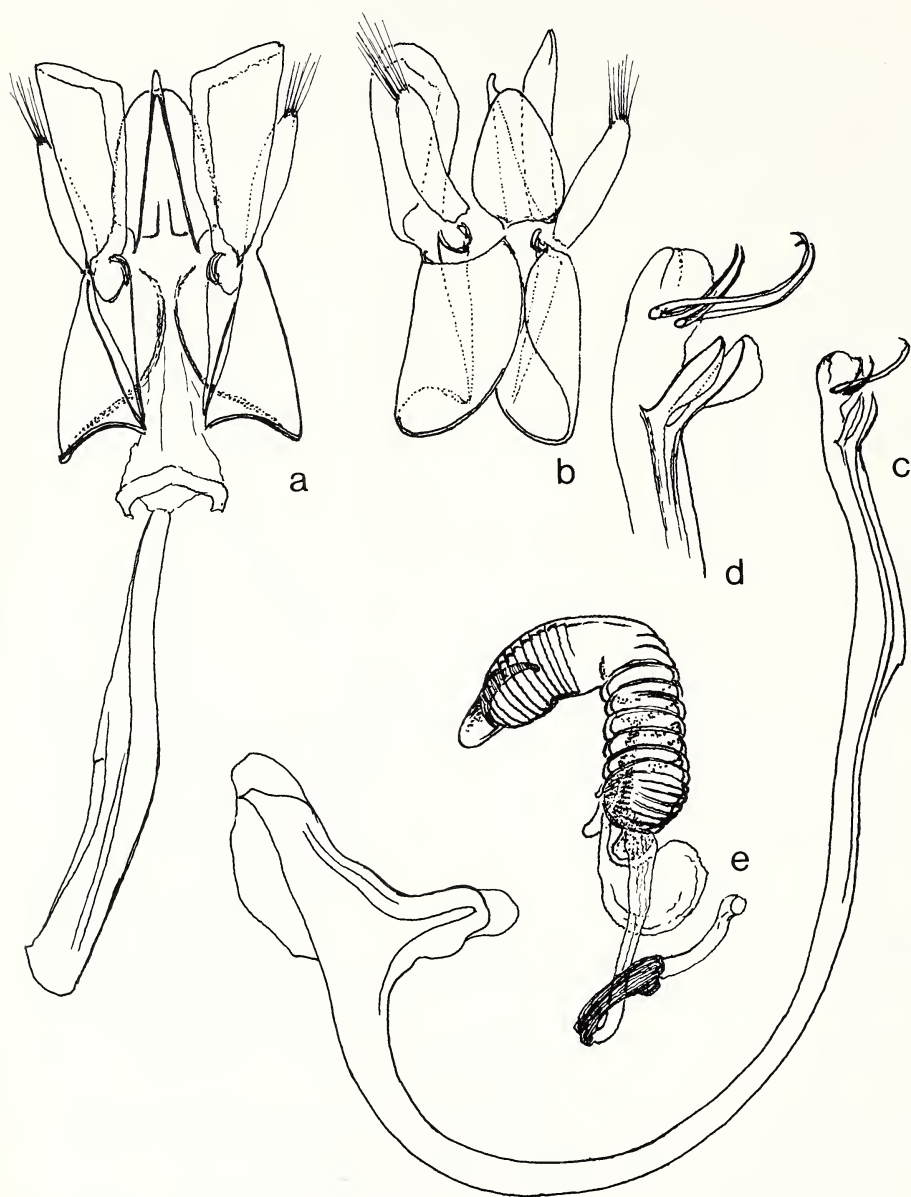


Fig. 138. *Scymnus (P.) tenebrosus*.

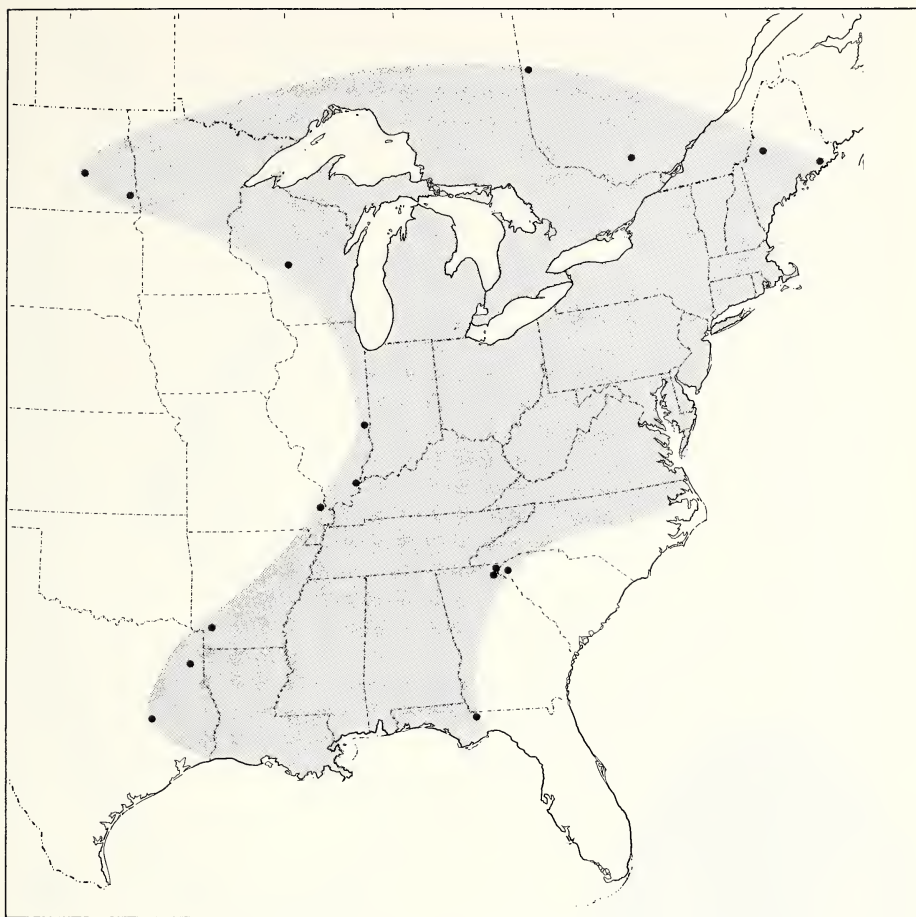


Fig. 139. Distribution. *Scymnus (P.) tenebrosus*.

Scymnus (Pullus) tenebrosus Mulsant

Fig. 138a-c; Map, Fig. 139

Scymnus (Pullus) tenebrosus Mulsant, 1850, p. 989.—Casey, 1899, p. 148.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 166.—Wingo, 1952, p. 40.—J. Chapin, 1974, p. 30.—Gordon, 1976b, p. 137.

Scymnus tenebrosus: LeConte, 1852, p. 140.—Crotch, 1874b, p. 268.—Horn, 1895, p. 106.

For detailed description, and discussion see Gordon, 1976b, p. 137.

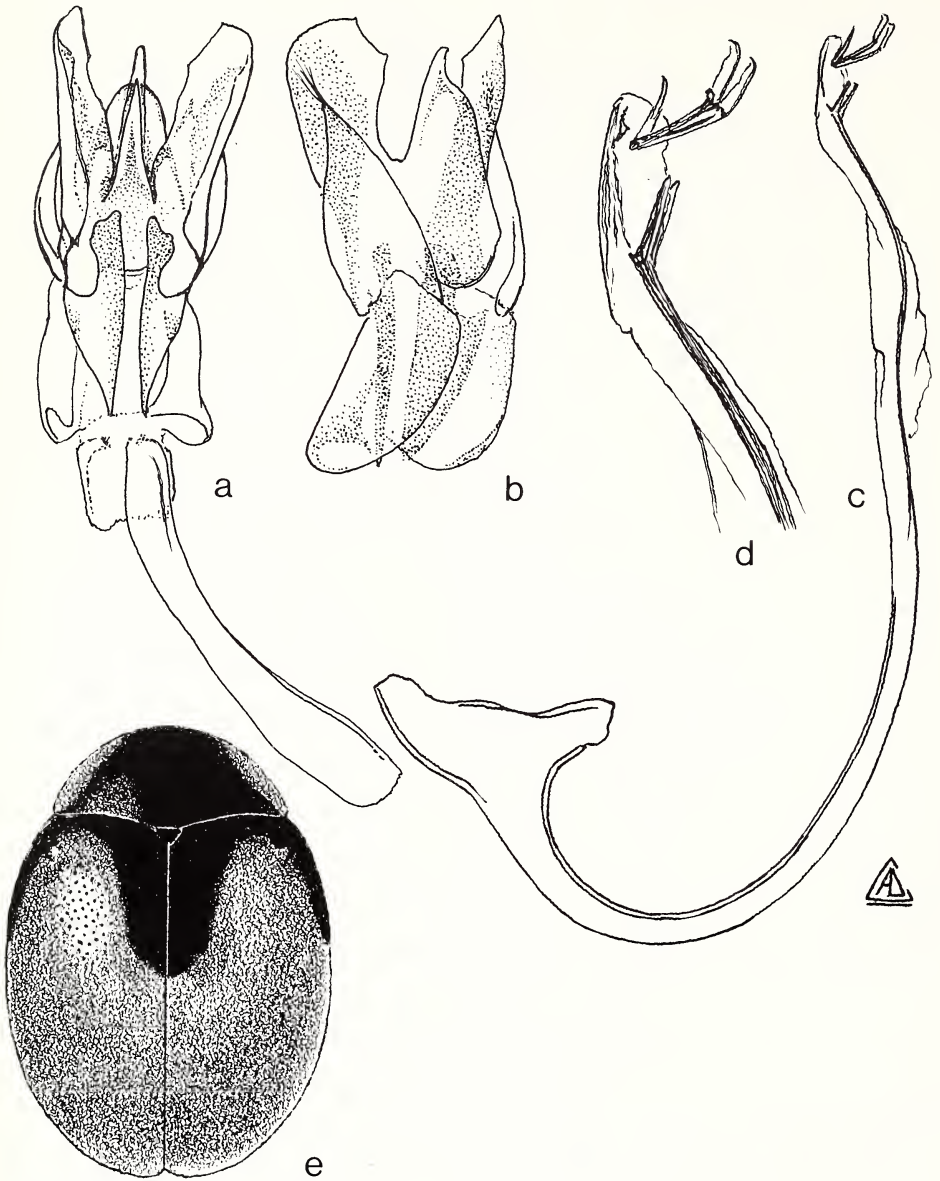


Fig. 140. *Scymnus (P.) falli*.

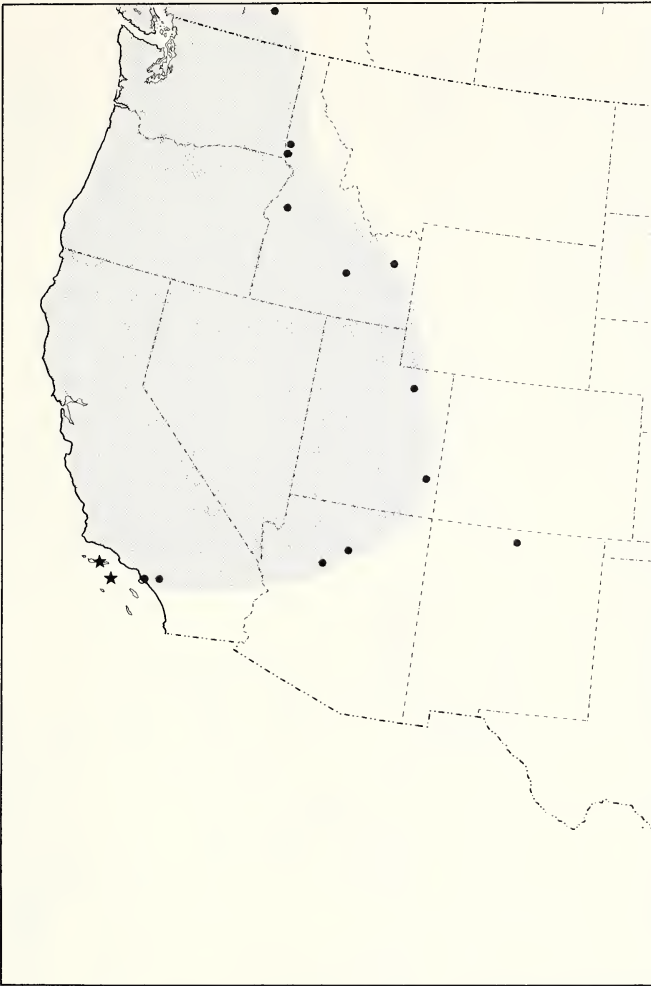


Fig. 141. Distribution. *Scymnus (P.) falli* (star); *S. P. solidus* (peripheral localities dotted).

Scymnus (Pullus) falli Gordon
Fig. 140a-e; Map, Fig. 141

Scymnus (Pullus) falli Gordon, 1976b, p. 140.

For detailed description, and discussion see Gordon, 1976b, p. 140.

Additional locality record: CALIFORNIA: Ventura Co., Santa Barbara Island.

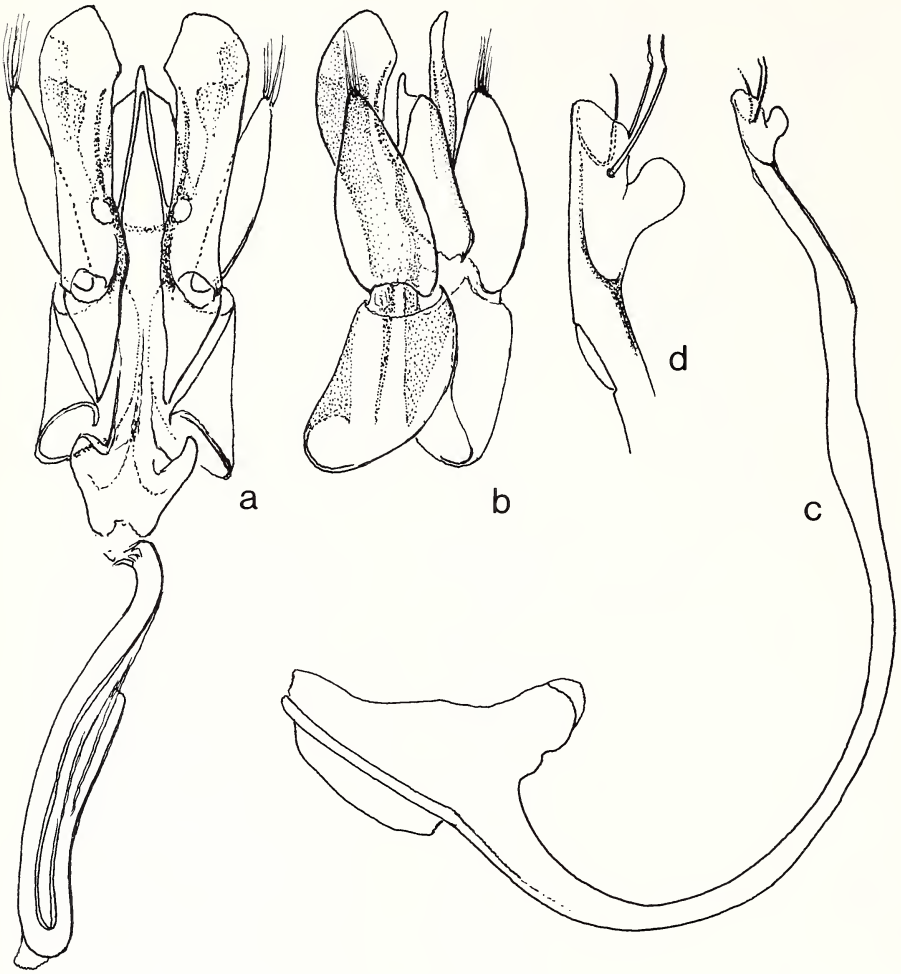


Fig. 142. *Scymnus (P.) solidus*.

Scymnus (Pullus) solidus Casey

Fig. 142a-d; Map, Fig. 141

Scymnus (Pullus) solidus Casey, 1899, p. 145.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 166.—Gordon, 1976b, p. 143.

Scymnus (Pullus) blaisdelli Casey, 1899, p. 147.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 155.—Hatch, 1961, p. 150.—Gordon, 1976b, p. 143.

For detailed description, and discussion see Gordon, 1976b, p. 143.

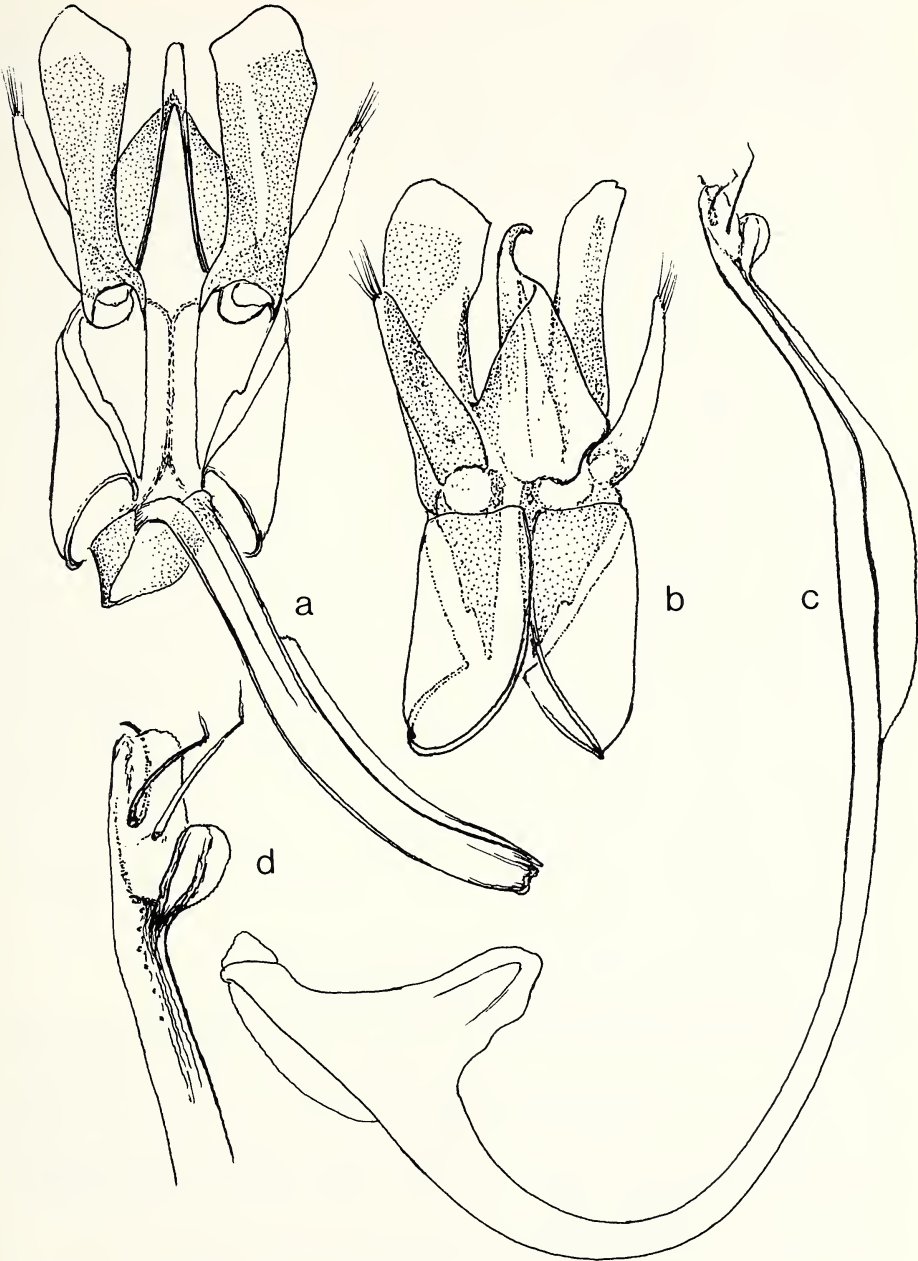


Fig. 143. *Scymnus (P.) garlandicus*.

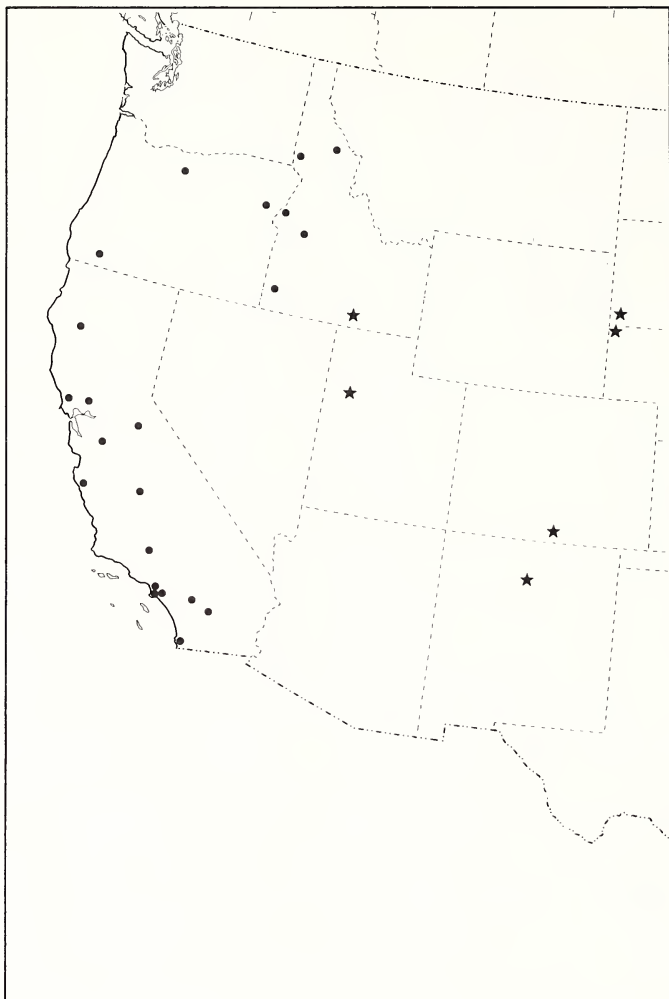


Fig. 144. Distribution. *Scymnus* (*P.*) *garlandicus* (star); *S.* (*P.*) *jacobianus* (dot).

Scymnus (*Pullus*) *garlandicus* Casey

Fig. 143a-d; Map, Fig. 144

Scymnus (*Pullus*) *garlandicus* Casey, 1899, p. 147.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 159.—Gordon, 1976b, p. 145.

For detailed description, and discussion see Gordon, 1976b, p. 145.

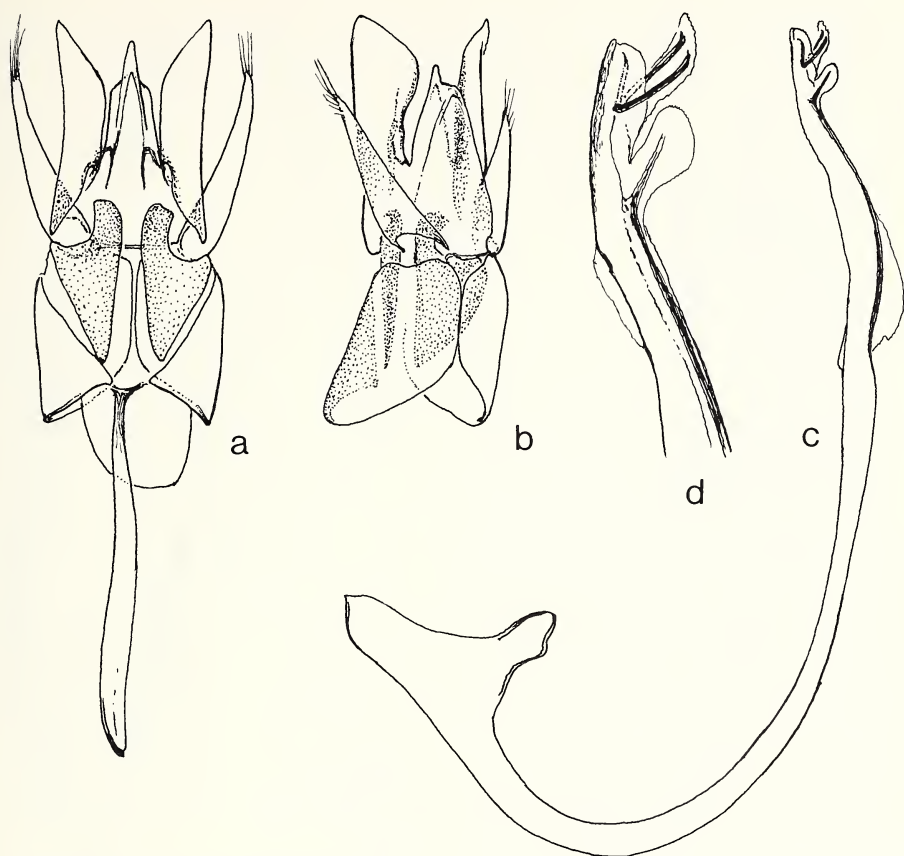


Fig. 145. *Scymnus (P.) jacobianus*.

Scymnus (Pullus) jacobianus Casey

Fig. 145a-d; Map, Fig. 144

Scymnus (Pullus) jacobianus Casey, 1899, p. 148.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 160.—Gordon, 1976b, p. 148.

Scymnus (Pullus) jacinto Casey, 1899, p. 148.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 160.—Gordon, 1976b, p. 148.

Scymnus (Pullus) extricatus Casey, 1899, p. 148.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 158.—Gordon, 1976b, p. 148.

For detailed description, and discussion see Gordon, 1976b, p. 148.

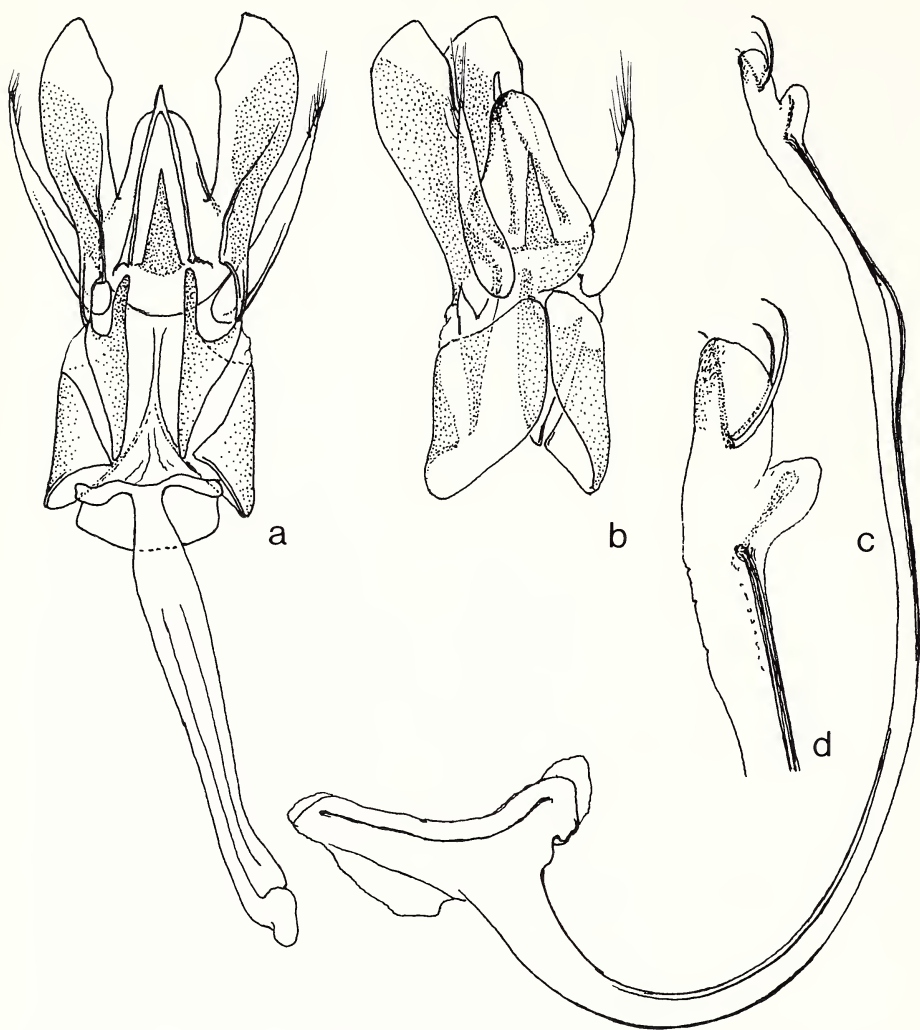


Fig. 146. *Scymnus (P.) humboldti*.

Scymnus (Pullus) humboldti Casey
Fig. 146a-d; Map, Fig. 147

Scymnus (Pullus) humboldti Casey, 1899, p. 146.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 160.—Gordon, 1976b, p. 150.

For detailed description, and discussion see Gordon, 1976b, p. 150.

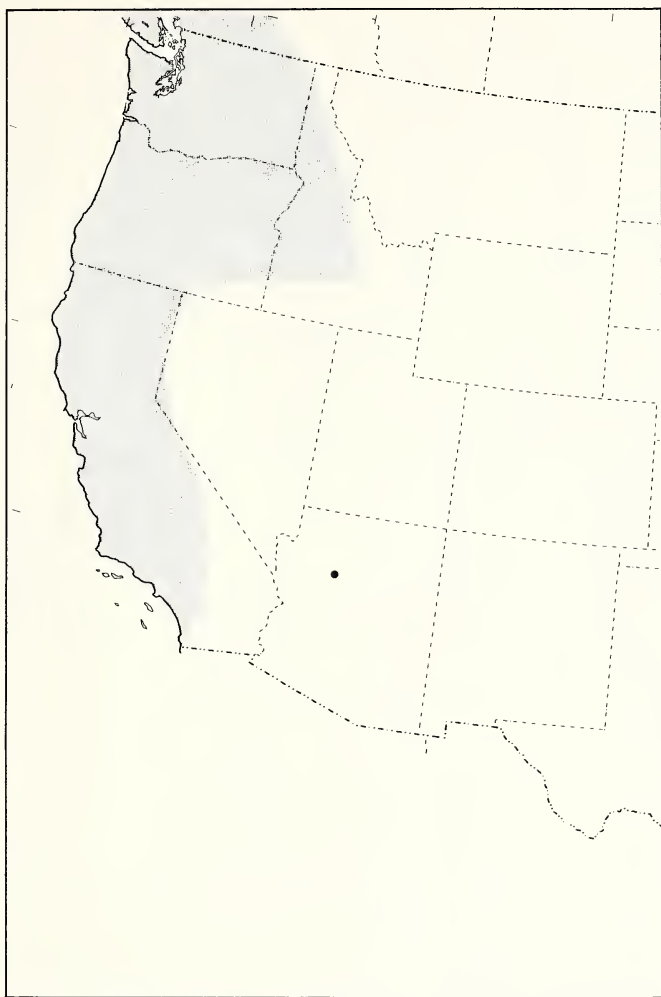


Fig. 147. Distribution. *Scymnus (P.) humboldti* (disjunct locality dotted).

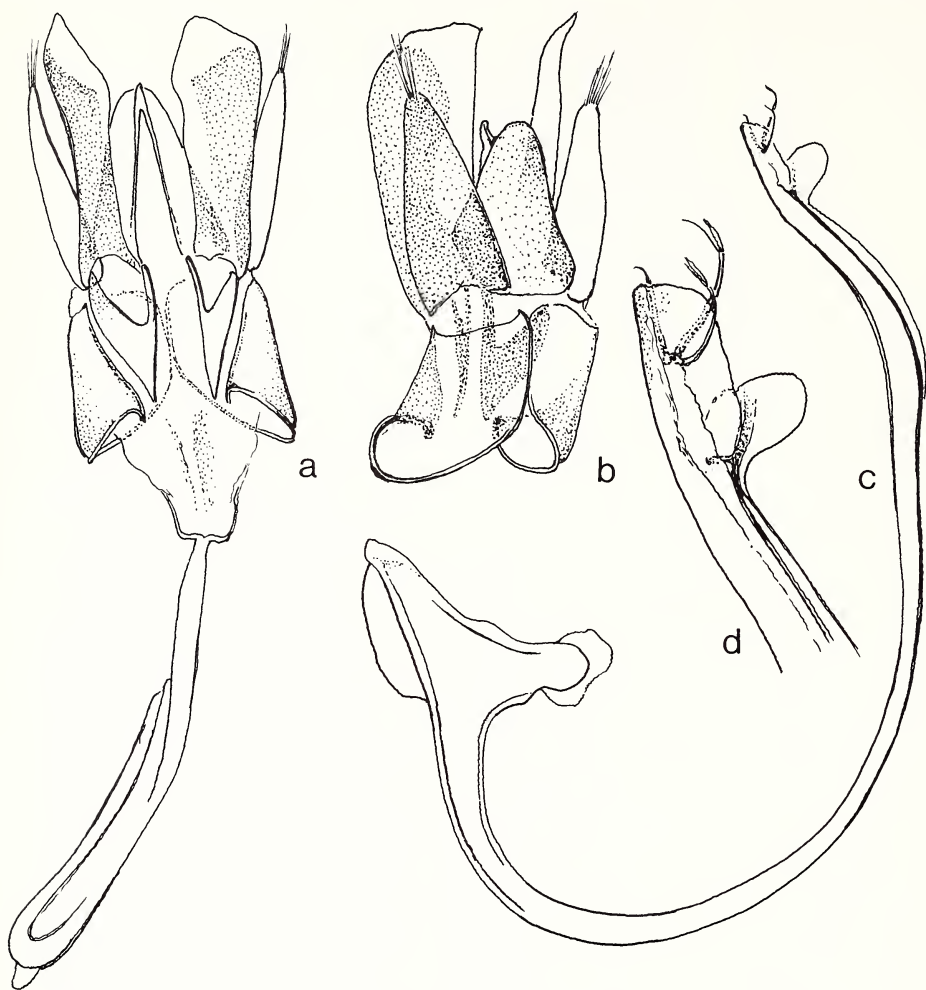


Fig. 148. *Scymnus (P.) barberi*.

Scymnus (Pullus) barberi Gordon
Fig. 148a-d; Map, Fig. 149

Scymnus (Pullus) barberi Gordon, 1976b, p. 153.

For detailed description, and discussion see Gordon, 1976b, p. 153.

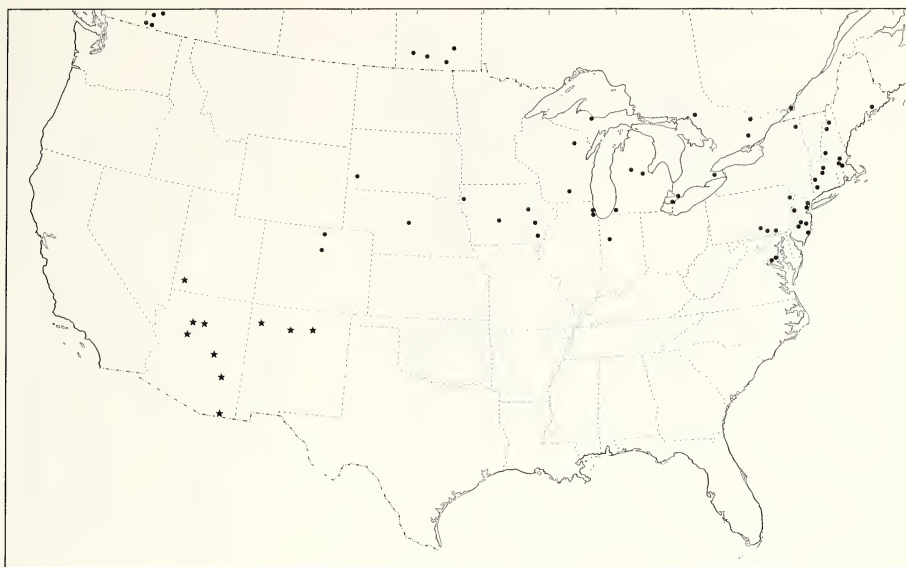


Fig. 149. Distribution. *Scymnus (P.) barberi* (star); *S. (P.) iowensis* (dot).

Scymnus (Pullus) iowensis Casey

Fig. 150a-d; Map, Fig. 149

Scymnus (Pullus) iowensis Casey, 1899, p. 143.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 160.—Wingo, 1952, p. 41.—Gordon, 1976b, p. 156.

Scymnus collaris Melsheimer, 1847, p. 180 (not Herbst, 1797).—LeConte, 1852, p. 141.—Mulsant, 1856, p. 152.—Horn, 1895, p. 103.—Blatchley, 1910, p. 529.—Weise, 1929, p. 33.

Scymnus (Pullus) collaris: Casey, 1899, p. 143.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 162.

Scymnus melsheimeri Weise, 1929, p. 33 (replacement name).

For detailed description, and discussion see Gordon, 1976b, p. 156.

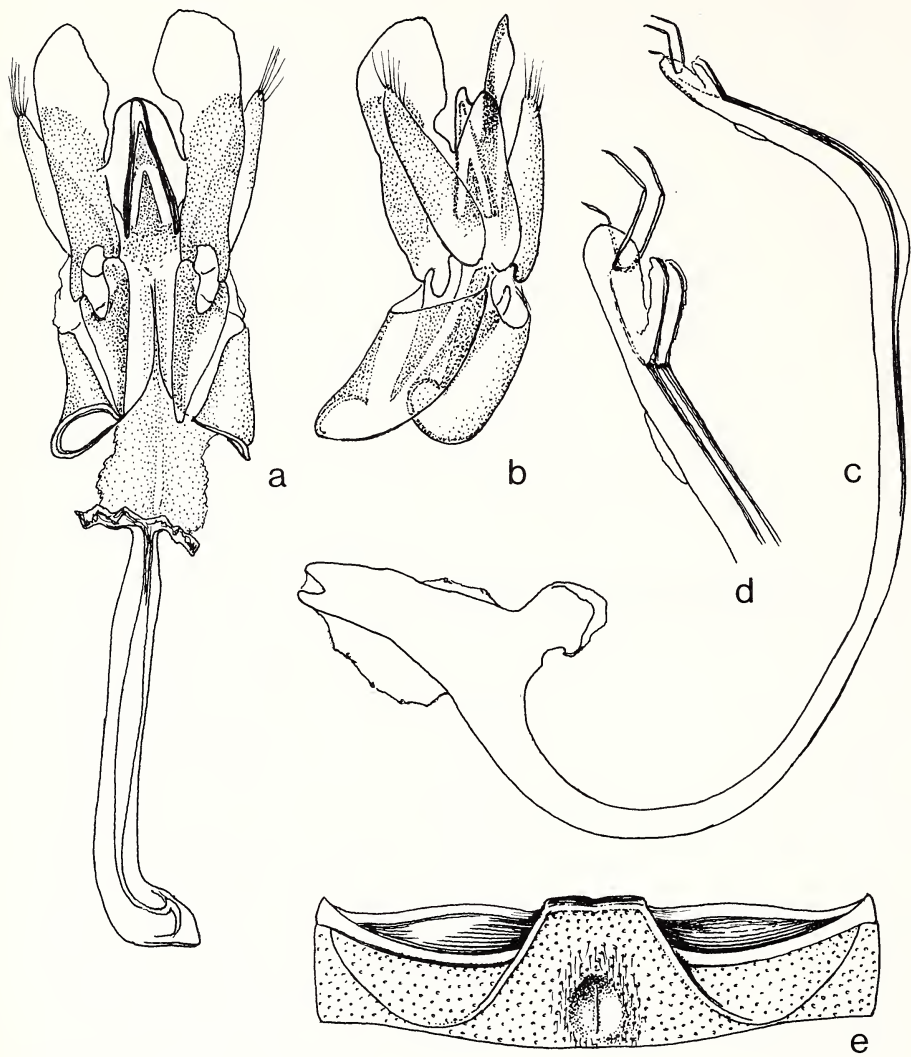


Fig. 150. *Scymnus (P.) iowensis*.

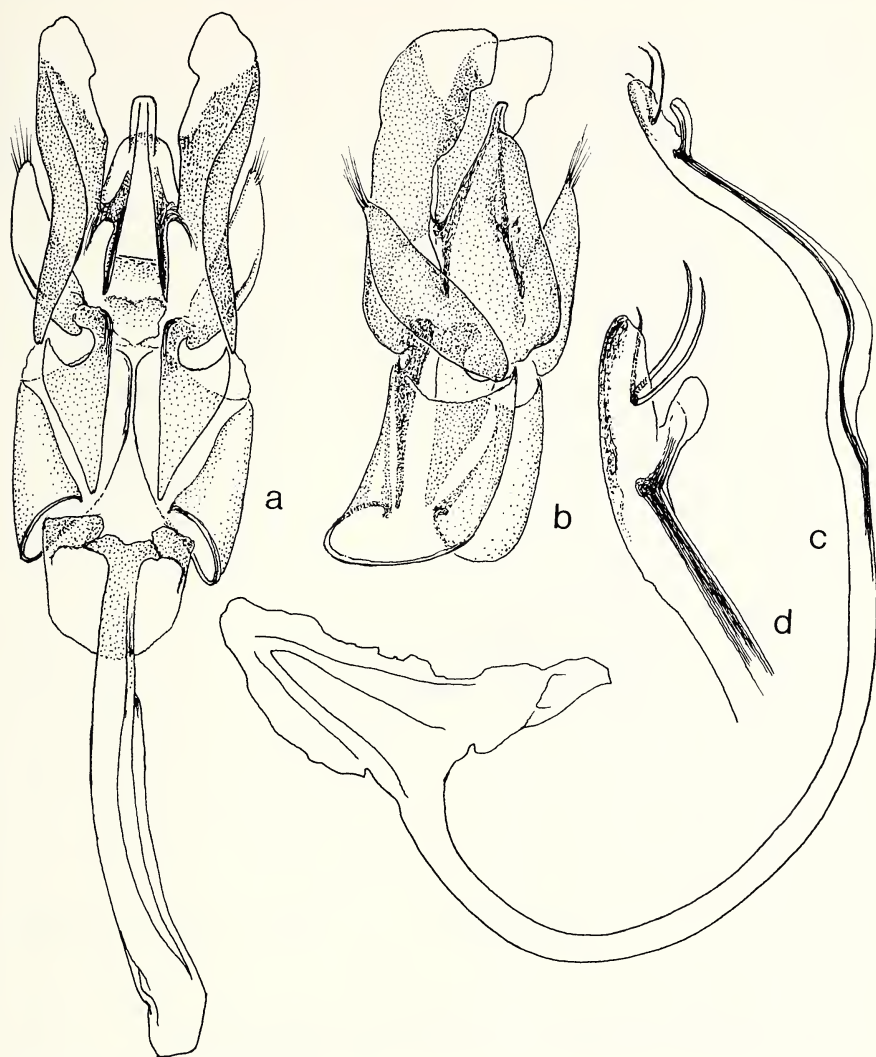


Fig. 151. *Scymnus (P.) calaveras*.

Scymnus (Pullus) calaveras Casey

Fig. 51a-d; Map, Fig. 152

Scymnus (Pullus) calaveras Casey, 1899, p. 150.—Bowditch, 1902, p. 207.—Casey, 1910, p. 110.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 155.—Malkin, 1943b, p. 193.—Hatch, 1961, p. 151.—Gordon, 1976b, p. 159.—Belicek, 1976, p. 306.
Scymnus (Pullus) saginatus Casey, 1899, p. 150.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 165.—Gordon, 1976b, p. 159.

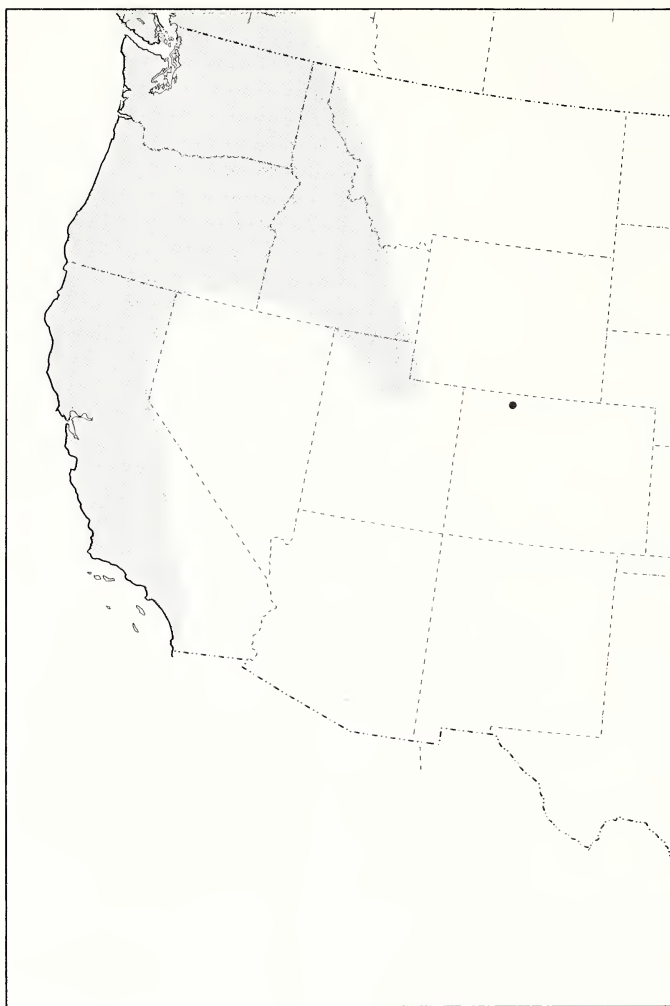


Fig. 152. Distribution. *Scymnus (P.) calaveras* (disjunct locality dotted).

Scymnus (Pullus) strenuus Casey, 1899, p. 150.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 166.—Malkin, 1943b, p. 194.—Hatch, 1961, p. 151.—Gordon, 1976b, p. 159.

Scymnus (Pullus) stygicus Casey, 1899, p. 151.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 166.—Gordon, 1976b, p. 159.

Scymnus (Pullus) tenuivestis Casey, 1899, p. 151.—Leng, 1920, p. 213.—Gordon, 1976b, p. 159.

Scymnus (Pullus) calaveras ab. *tenuivestis*: Korschefsky, 1931, p. 156.

For detailed description, and discussion see Gordon, 1976b, p. 159.

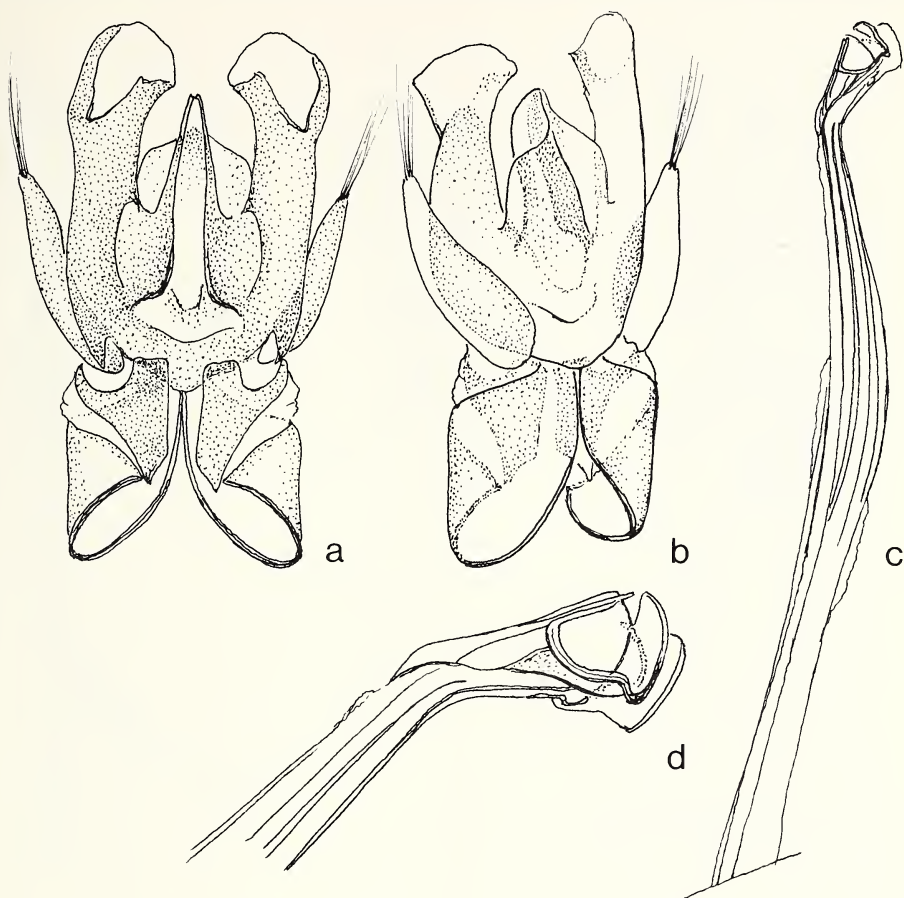


Fig. 153. *Scymnus (P.) majus*.

Scymnus (Pullus) majus, new name

Fig. 153a-d

Scymnus (Pullus) majusculus Wingo, 1952, p. 40.—Gordon, 1976b, p. 163 (not *Scymnus (Pullus) majusculus* Mader, 1950).

Diagnosis. Description and distribution.—See Gordon (1976b). It has been pointed out to me by Herbert Dozier that the name *majusculus* Wingo, 1952, is a homonym of *majusculus* Mader, 1950. I therefore propose the name *majus*, a Latin adjective referring to the large size, for this species.

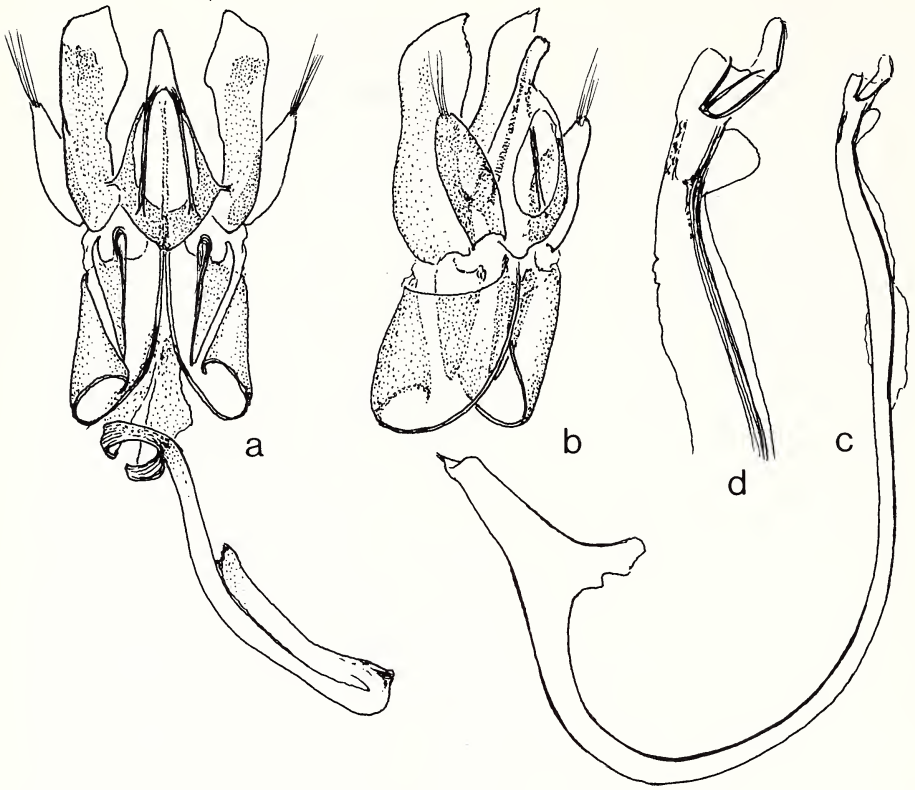


Fig. 154. *Scymnus (P.) ignarus*.

Scymnus (Pullus) ignarus Gordon
Fig. 154a-d; Map, Fig. 155

Scymnus (Pullus) ignarus Gordon, 1976b, p. 163.

For detailed description, and discussion see Gordon, 1976b, p. 163.

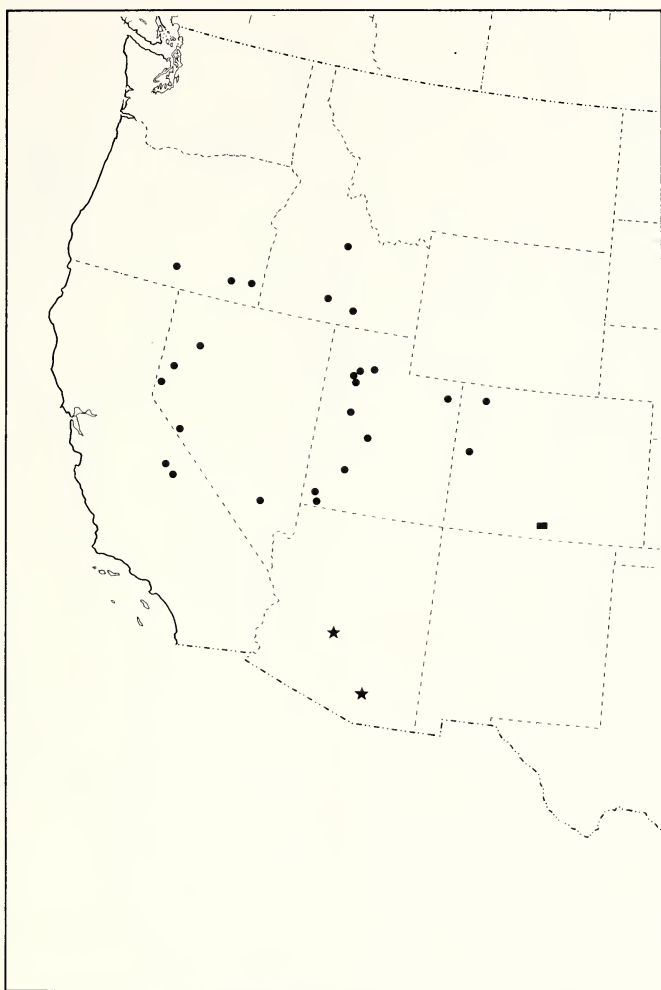


Fig. 155. Distribution. *Scymnus (P.) ignarus* (star); *S. (P.) monticola* (rectangle); *S. (P.) utahensis* (dot).

Scymnus (Pullus) monticola Casey

Fig. 155

Scymnus (Pullus) monticola Casey, 1899, p. 146.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 162.—Gordon, 1976b, p. 165.

For detailed description, and discussion see Gordon, 1976b, p. 165.

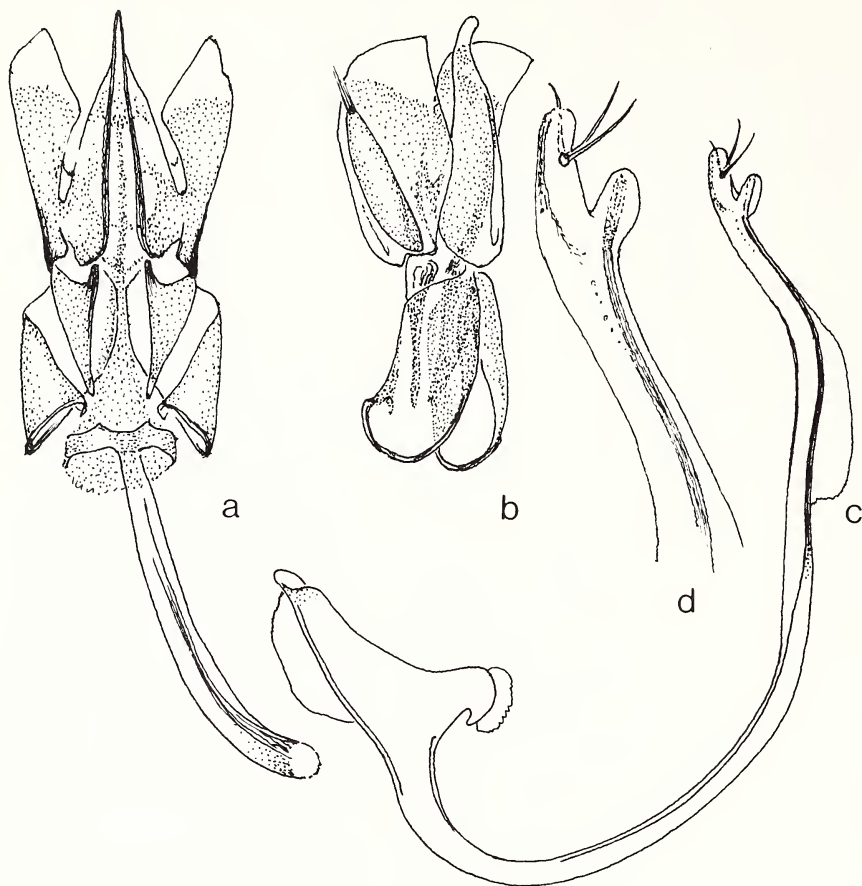


Fig. 156. *Scymnus (P.) utahensis*.

Scymnus (Pullus) utahensis Gordon

Fig. 156a-d; Map, Fig. 155

Scymnus (Pullus) utahensis Gordon, 1976b, p. 165.

For detailed description, and discussion see Gordon, 1976b, p. 165.

Additional locality records: OREGON: Harney Co.

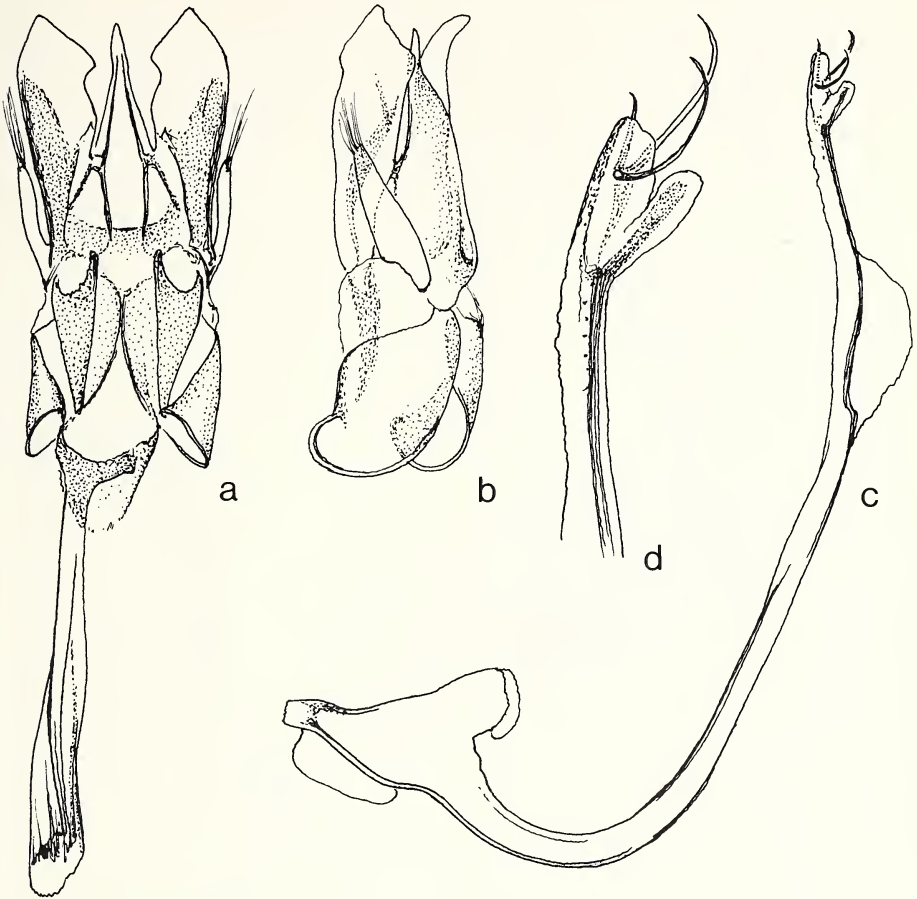


Fig. 157. *Scymnus (P.) renoicus*.

Scymnus (Pullus) renoicus Casey

Fig. 157a-d; Map, Fig. 158

Scymnus (Pullus) renoicus Casey, 1899, p. 149.—Bowditch, 1902, p. 207.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 161.—Hatch, 1961, p. 151.—Gordon, 1976b, p. 169.

For detailed description, and discussion see Gordon, 1976b, p. 169.

Additional locality records: IDAHO: Rupert. UTAH: Millard Co., Hawbush Dunes, SE Delta.



Fig. 158. Distribution. *Scymnus (P.) renoicus* (star); *S. (P.) horni* (shaded, peripheral localities dotted).

Scymnus (Pullus) horni Gorham

Fig. 159a-d; Map, Fig. 158

Scymnus (Pullus) horni Gorham, 1897, p. 229.—Casey, 1899, p. 144.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 159.—Gordon, 1976b, p. 172.

For detailed description, and discussion see Gordon, 1976b, p. 172.

Additional locality records: TEXAS: Brewster Co., Marathon; Culberson Co., SE Van Horn; Garza Co. 2 mi. N. Justiceburg; Hudspeth Co. 10 mi. S. Cornudas.

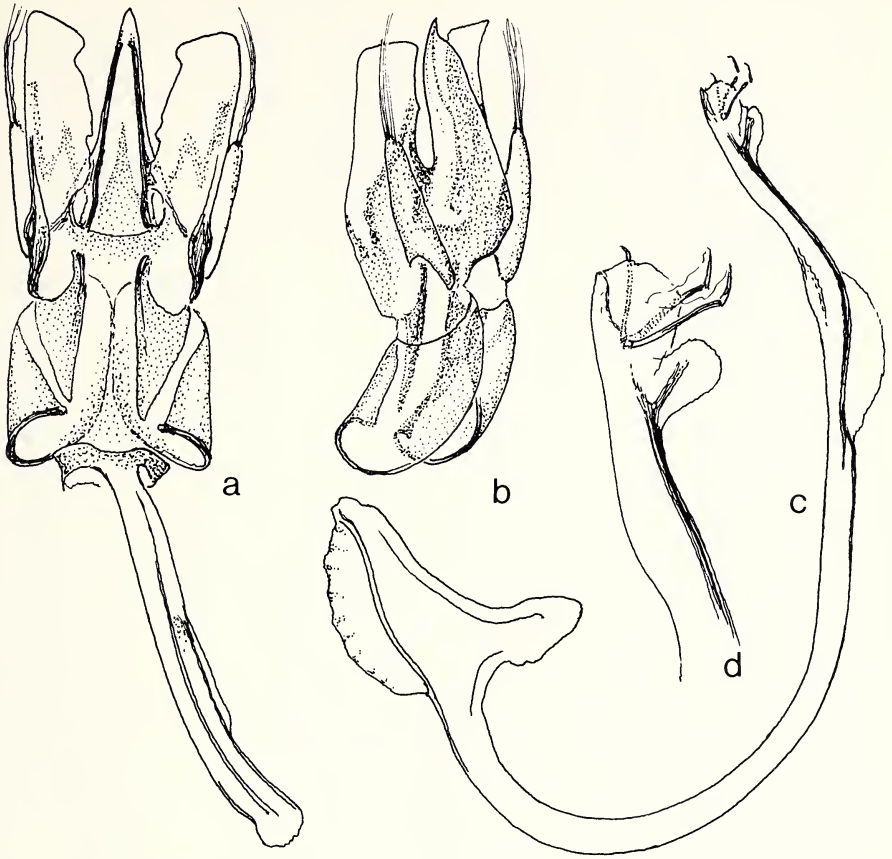


Fig. 159. *Scymnus (P.) horni*.

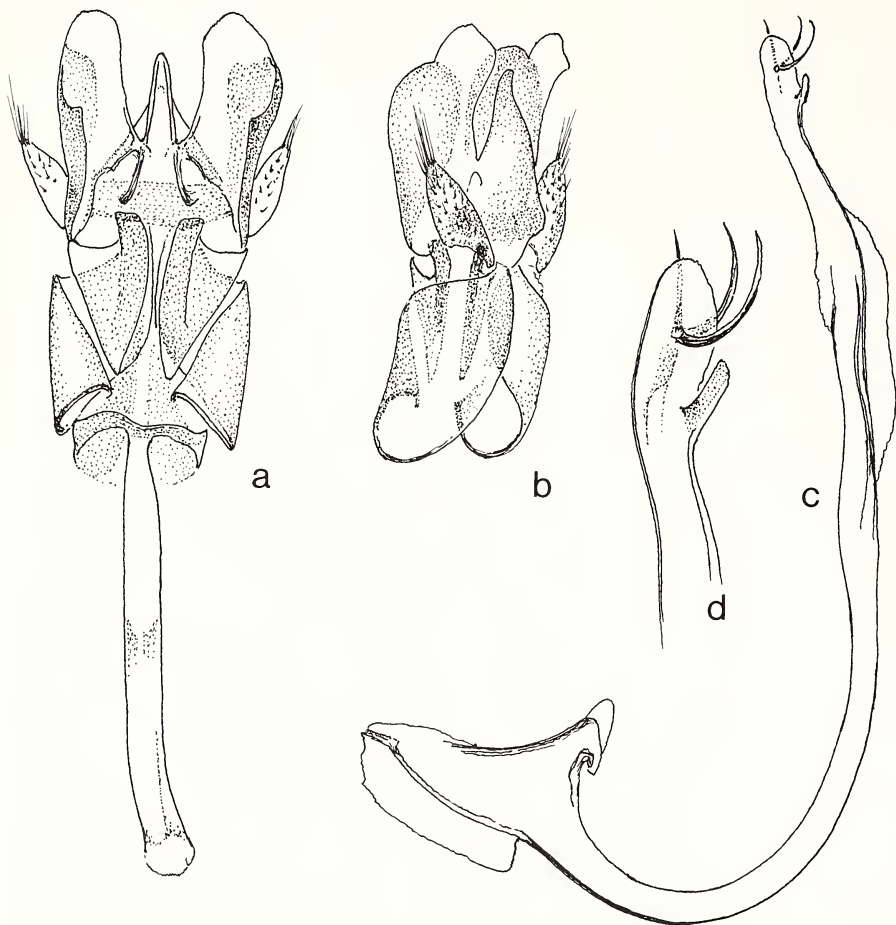


Fig. 160. *Scymnus (P.) mormon*.

Scymnus (Pullus) mormon Casey

Fig. 160a-d; Map, Fig. 161

Scymnus (Pullus) mormon Casey, 1899, p. 150.—Leng, 1920, p. 213.—Casey, 1924, p. 176.—Korschevsky, 1931, p. 162.—Gordon, 1976b, p. 175.

Scymnus (Pullus) subsimilis Casey, 1899, p. 150.—Casey, 1910, p. 109.—Casey, 1924, p. 176.

For detailed description, and discussion see Gordon, 1976b, p. 175.

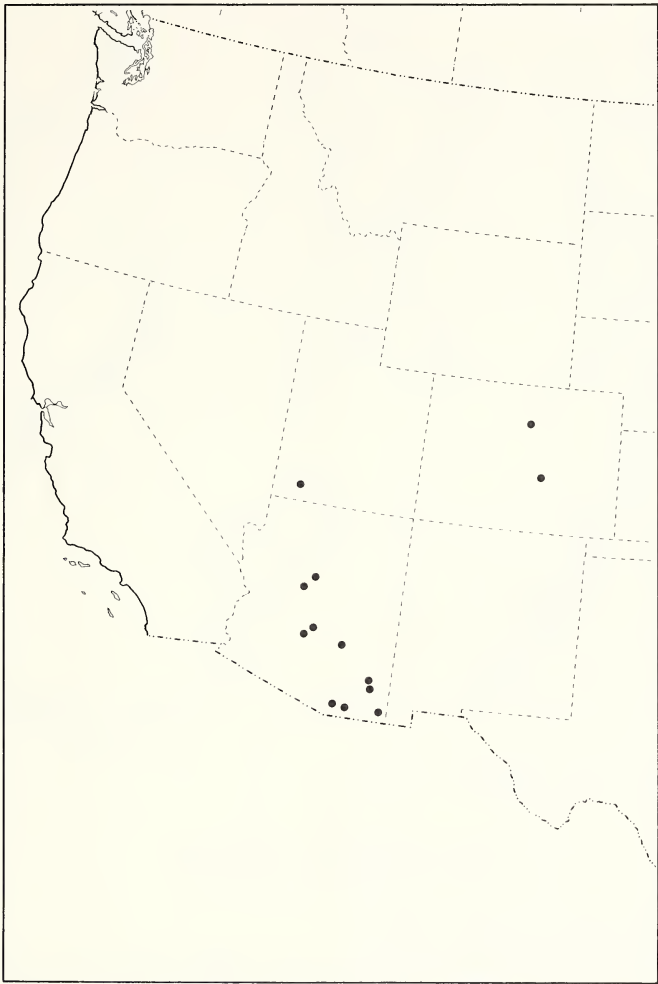


Fig. 161. Distribution. *Scymnus (P.) mormon*.

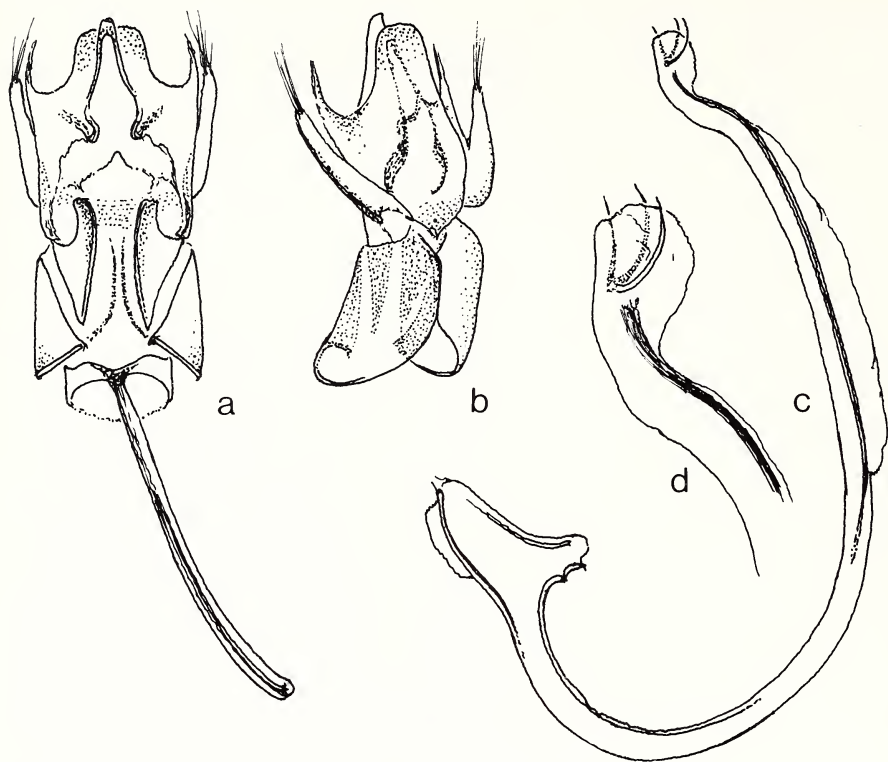


Fig. 162. *Scymnus (P.) ardelio*.

Scymnus (Pullus) ardelio Horn

Fig. 162a-d; Map, Fig. 163

Scymnus ardelio Horn, 1895, p. 105.

Scymnus (Pullus) ardelio: Casey, 1899, p. 148.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 154.—Hatch, 1961, p. 50.—Gordon, 1976b, p. 177.—Belicek, 1976, p. 305.

Scymnus (Pullus) apacheanus Casey, 1899, p. 146.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 154.—Gordon, 1976b, p. 177.

Scymnus (Pullus) decipiens Casey, 1899, p. 147 (not Weise, 1885).—Leng, 1920, p. 213.—Weise, 1929, p. 33.—Gordon, 1976b, p. 177.

Scymnus sanctus Weise, 1929, p. 33 (new name for *decipiens* Casey).—Korschevsky, 1931, p. 165.

For detailed description, and discussion see Gordon, 1976b, p. 177.

Additional locality records: IDAHO: Tuttle. NEW MEXICO: Lea Co., 8 mi. E. Lovington. TEXAS: Culberson Co., 13 mi. W. Van Horn; Pecos Co., 6 mi. N. Pyote.

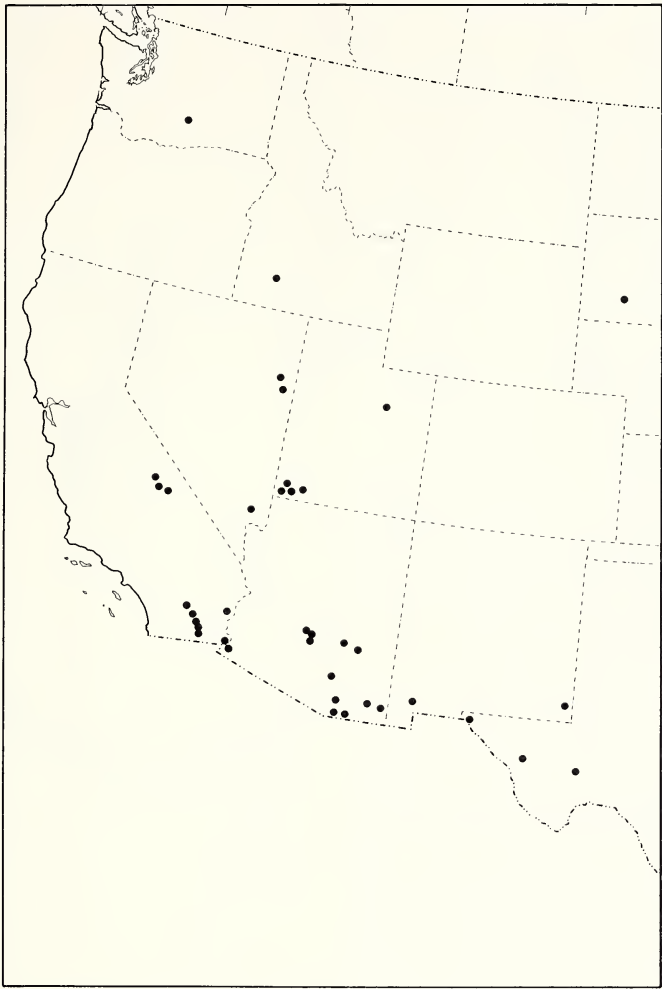


Fig. 163. Distribution. *Scymnus (P.) ardelio*.

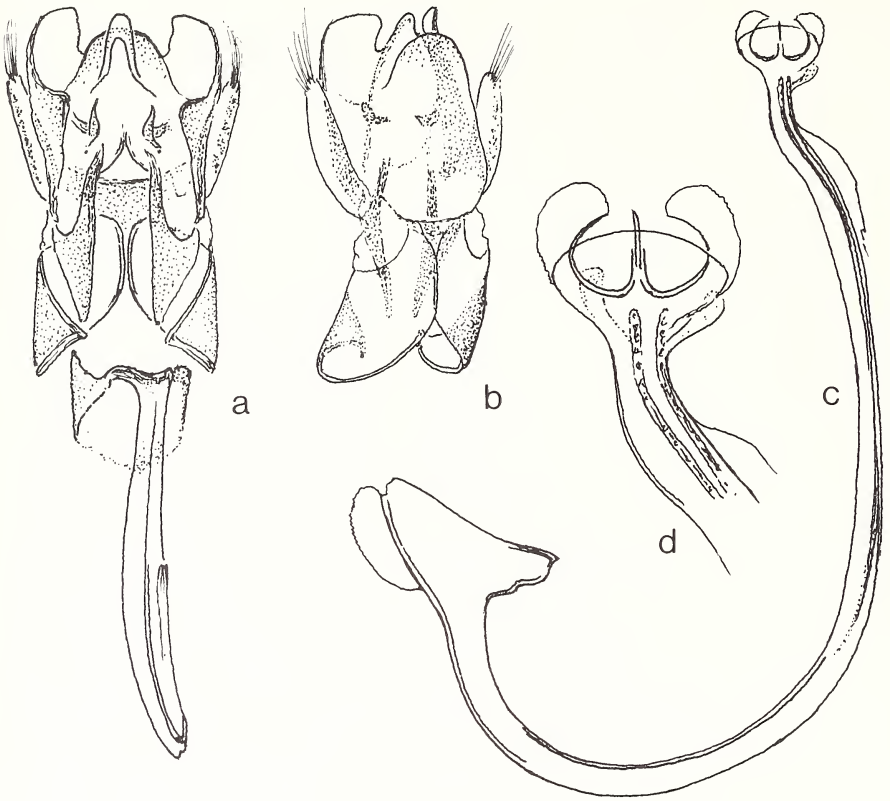


Fig. 164. *Scymnus (P.) erythronotum*.

Scymnus (Pullus) erythronotum Gordon

Fig. 164a-d; Map, Fig. 165

Scymnus (Pullus) erythronotum Gordon, 1976b, p. 181.

For detailed description, and discussion see Gordon, 1976b, p. 181.



Fig. 165. Distribution. *Scymnus (P.) erythronotum*.

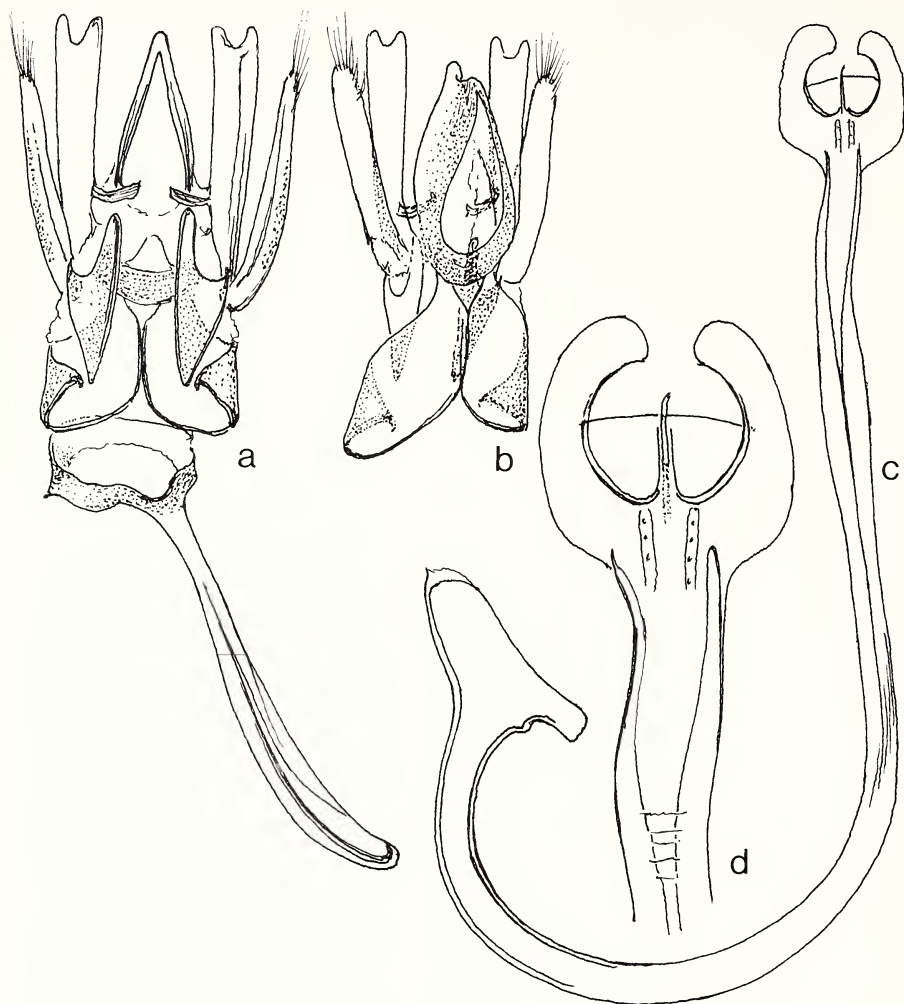


Fig. 166. *Scymnus (P.) aridus*.

Scymnus (Pullus) aridus Casey

Fig. 166a-d; Map, Fig. 167

Scymnus (Pullus) aridus Casey, 1899, p. 146.—Casey, 1924, p. 176.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 154.—Gordon, 1976b, p. 184.

For detailed description, and discussion see Gordon, 1976b, p. 184.

Additional locality records: UTAH: San Juan Co., 26 mi. S. Hanksville.



Fig. 167. Distribution. *Scymnus (P.) aridus*.

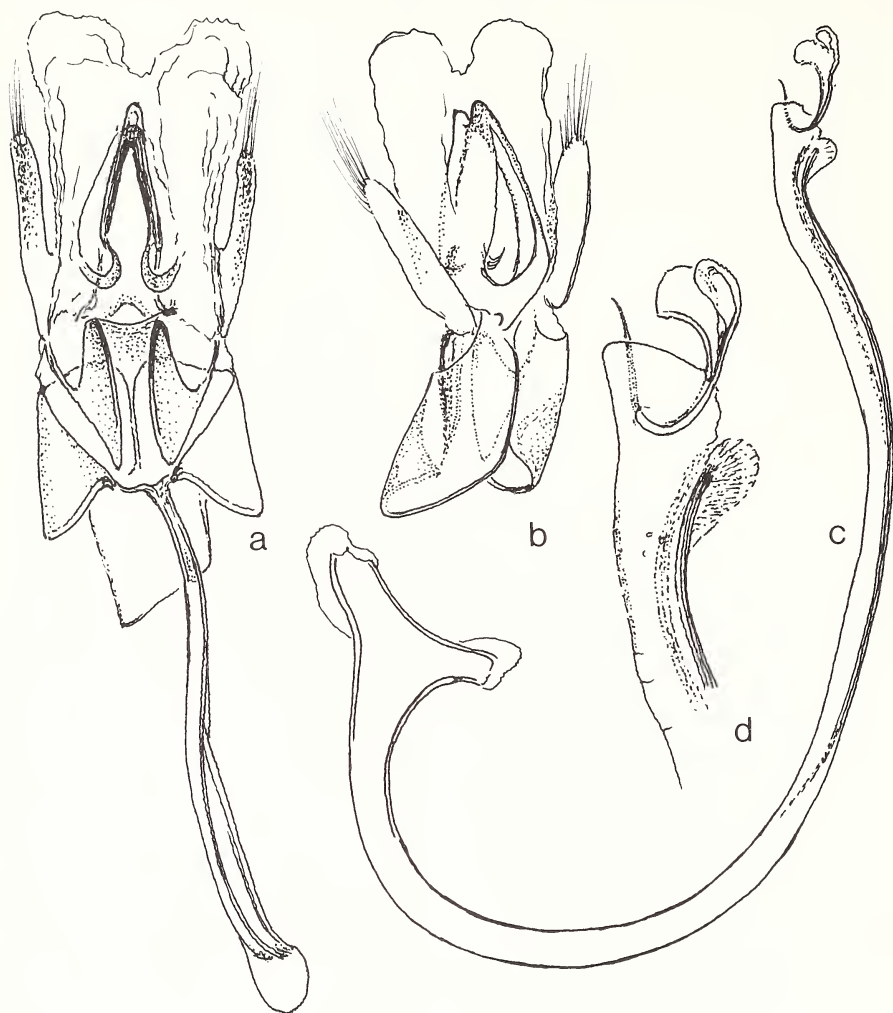


Fig. 168. *Scymnus (P.) aridoides*.

Scymnus (Pullus) aridoides Gordon

Fig. 168a-d; Map, Fig. 169

Scymnus (Pullus) aridoides Gordon, 1976b, p. 187.

For detailed description, and discussion see Gordon, 1976b, p. 187.



Fig. 169. Distribution. *Scymnus (P.) aridoides*.

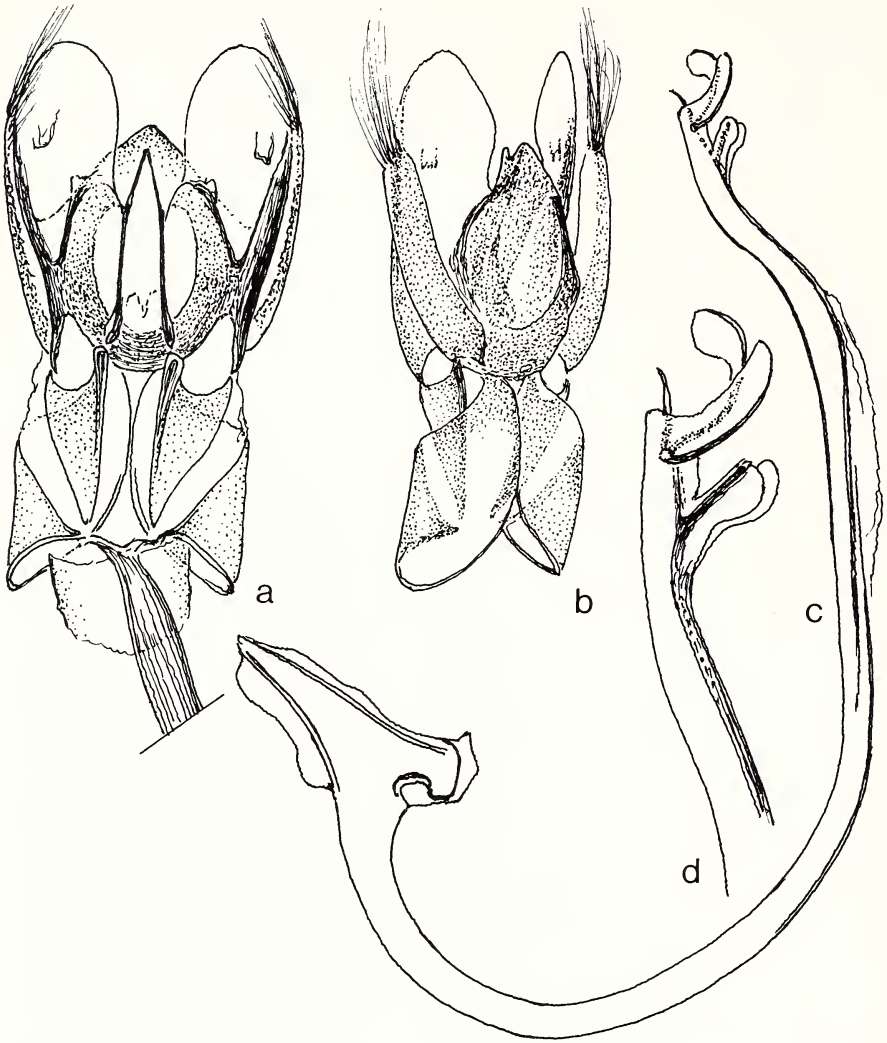


Fig. 170. *Scymnus (P.) consobrinus*.

Scymnus (Pullus) consobrinus LeConte

Fig. 170a-d; Map, Fig. 171

Scymnus consobrinus LeConte, 1852, p. 139.—Horn, 1895, p. 103.—Crotch, 1874b, p. 266.

Scymnus (Pullus) consobrinus: Mulsant, 1853, p. 153.—Casey, 1899, p. 142.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 157.—Wingo, 1952, p. 42.—Gordon, 1976b, p. 190.

For detailed description, and discussion see Gordon, 1976b, p. 190.

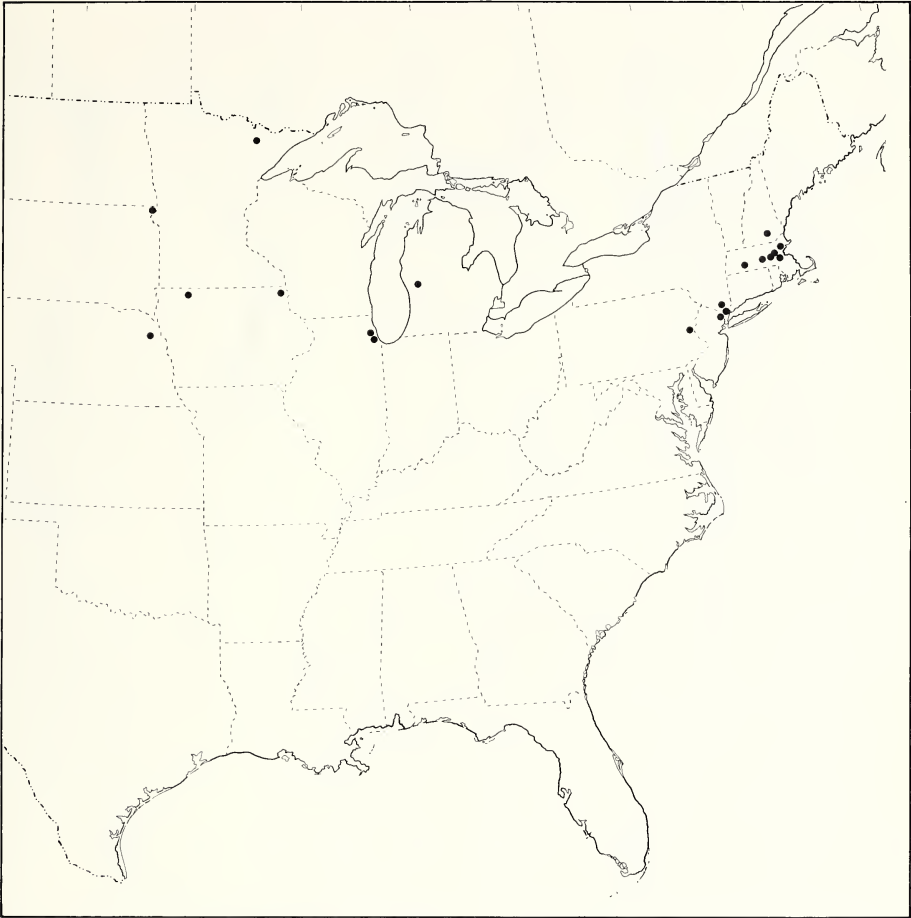


Fig. 171. Distribution. *Scymnus (P.) consobrinus*.

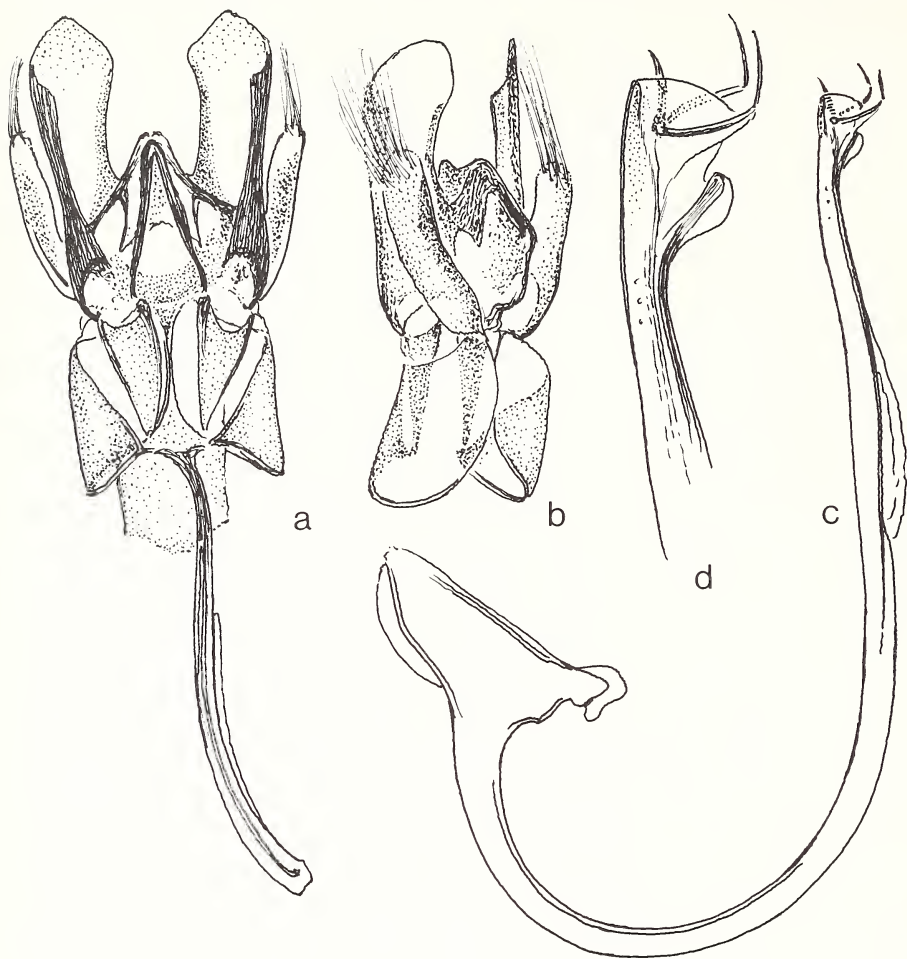


Fig. 172. *Scymnus (P.) mendocino*.

Scymnus (Pullus) mendocino Casey

Fig. 172a-d; Map, Fig. 173

Scymnus (Pullus) mendocino Casey, 1899, p. 151.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 162.—Gordon, 1976b, p. 193.

For detailed description, and discussion see Gordon, 1976b, p. 193.

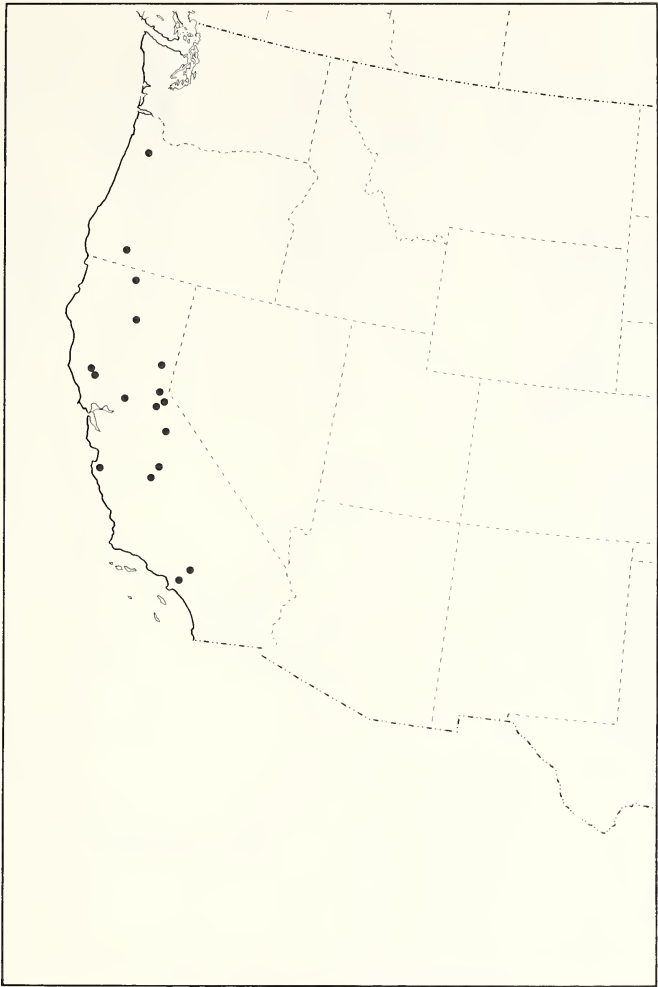


Fig. 173. Distribution. *Scymnus (P.) mendocino*.

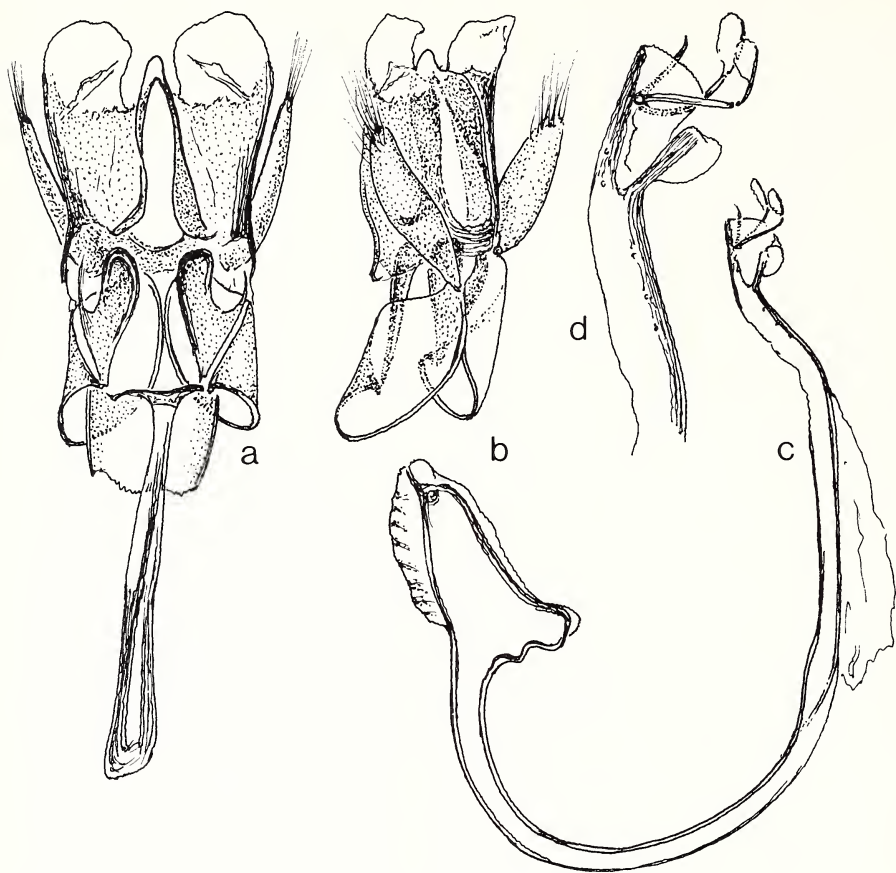


Fig. 174. *Scymnus (P.) cockerelli*.

Scymnus (Pullus) cockerelli Casey

Fig. 174a-d; Map, Fig. 175

Scymnus (Pullus) cockerelli Casey, 1899, p. 144.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 156.—Gordon, 1976b, p. 196.

Scymnus mimus Fall, 1901, p. 234.—Gordon, 1976b, p. 196.

Scymnus (Pullus) mimus: Leng, 1920, p. 213.—Korschefsky, 1931, p. 162.

For detailed description, and discussion see Gordon, 1976b, p. 196.

Additional locality record: UTAH: Leeds.

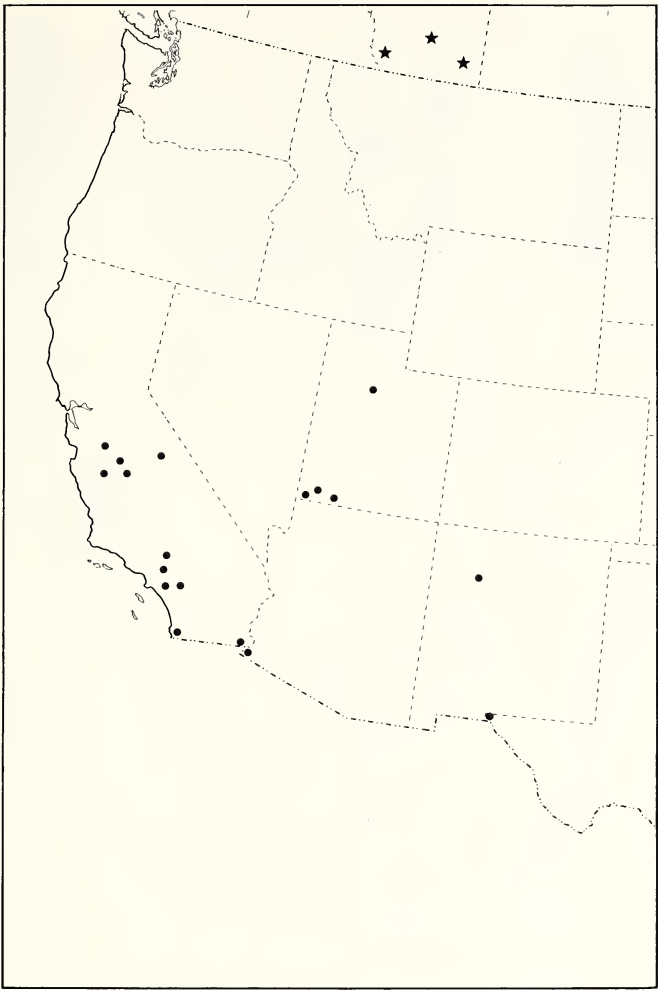


Fig. 175. Distribution. *Scymnus (P.) cockerelli* (dot); *S. (P.) carri* (star).

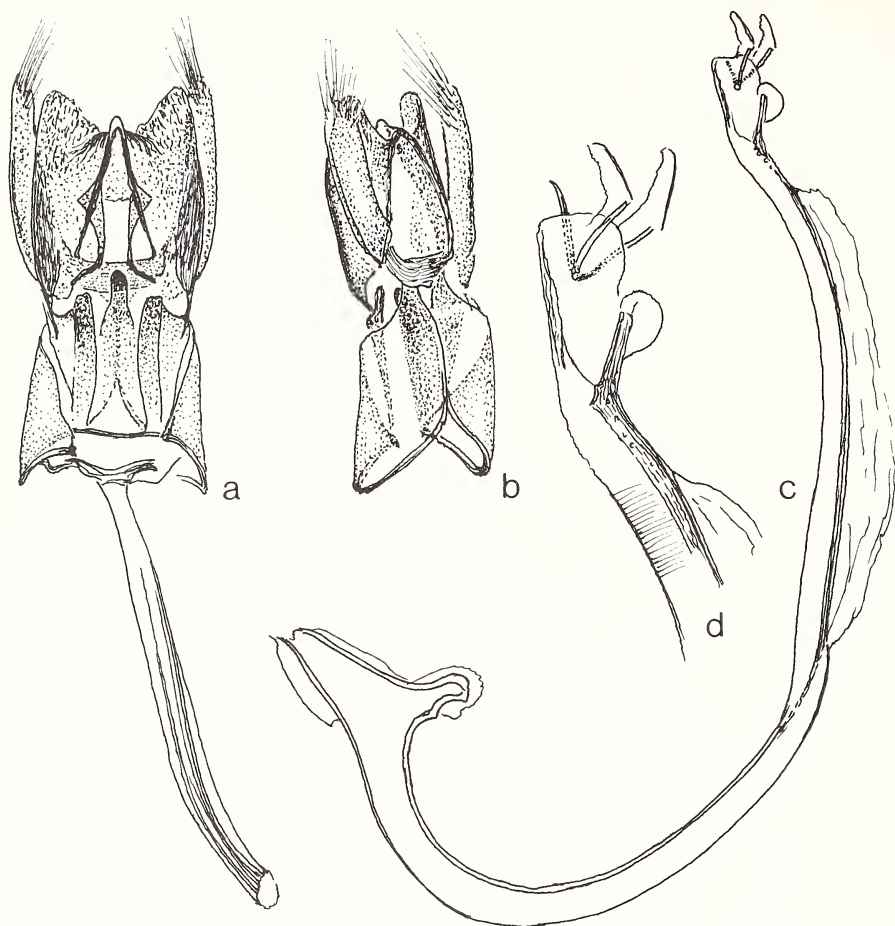


Fig. 176. *Scymnus* (P.) *carri*.

Scymnus (Pullus) *carri* Gordon
Fig. 176a-d; Map, Fig. 175

Scymnus (Pullus) *carri* Gordon, 1976b, p. 199.—Belicek, 1976, p. 304.

For detailed description, and discussion see Gordon, 1976b, p. 199.

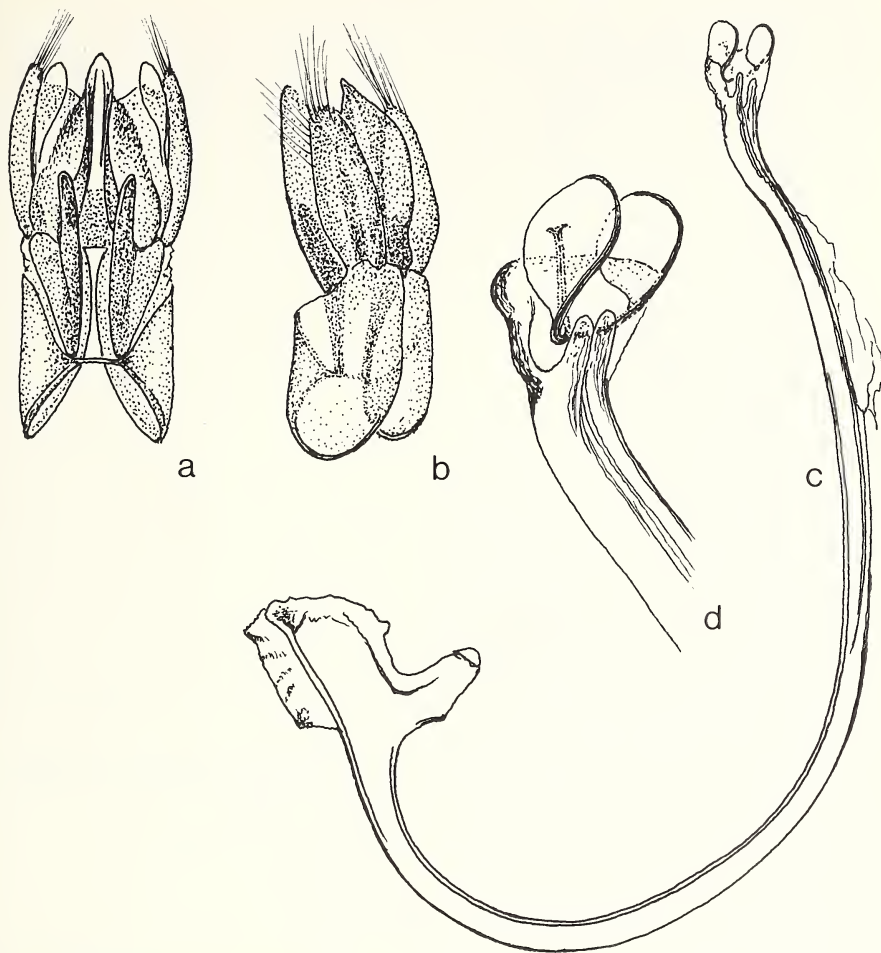


Fig. 177. *Scymnus* (*P.*) *nugator*.

Scymnus (*Pullus*) *nugator* Casey

Fig. 177a-d; Map, Fig. 178

Scymnus (*Pullus*) *nugator* Casey, 1899, p. 140.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 163.—Gordon, 1976b, p. 199.

For detailed description, and discussion see Gordon, 1976b, p. 199.

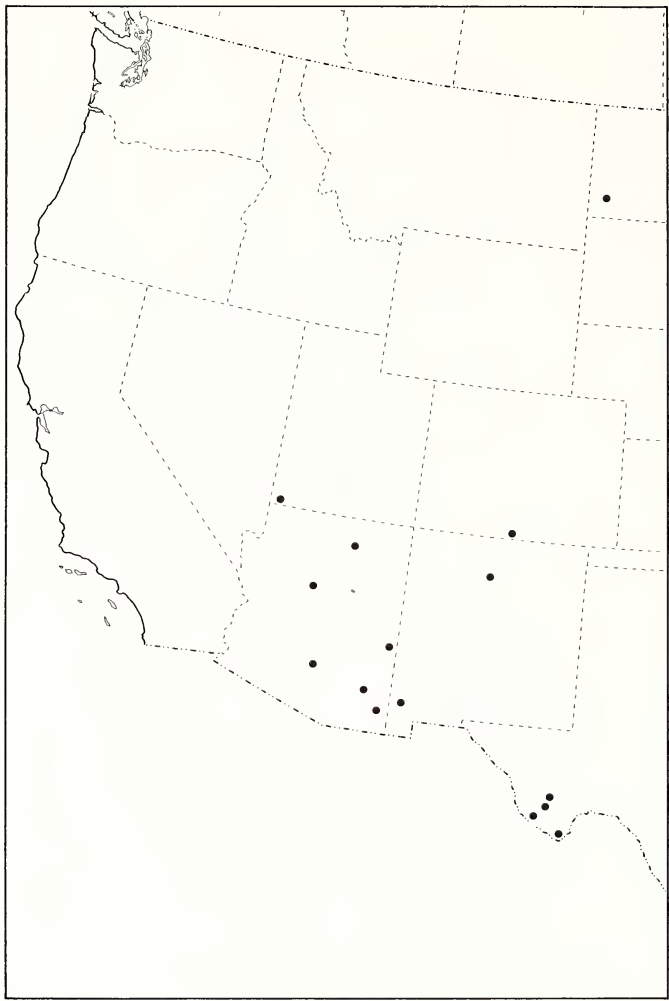


Fig. 178. Distribution. *Scymnus (P.) nugator*.

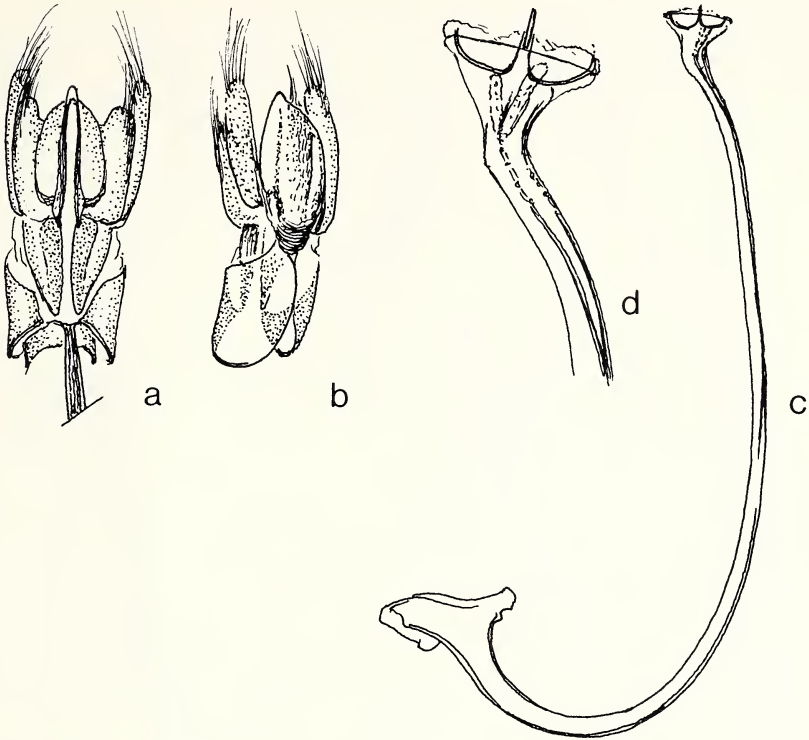


Fig. 179. *Scymnus (P.) neomexicanus*.

Scymnus (Pullus) neomexicanus Gordon
Fig. 179a-d; Map, Fig. 180

Scymnus (Pullus) neomexicanus Gordon, 1976b, p. 203.

For detailed description, and discussion see Gordon, 1976b, p. 203.

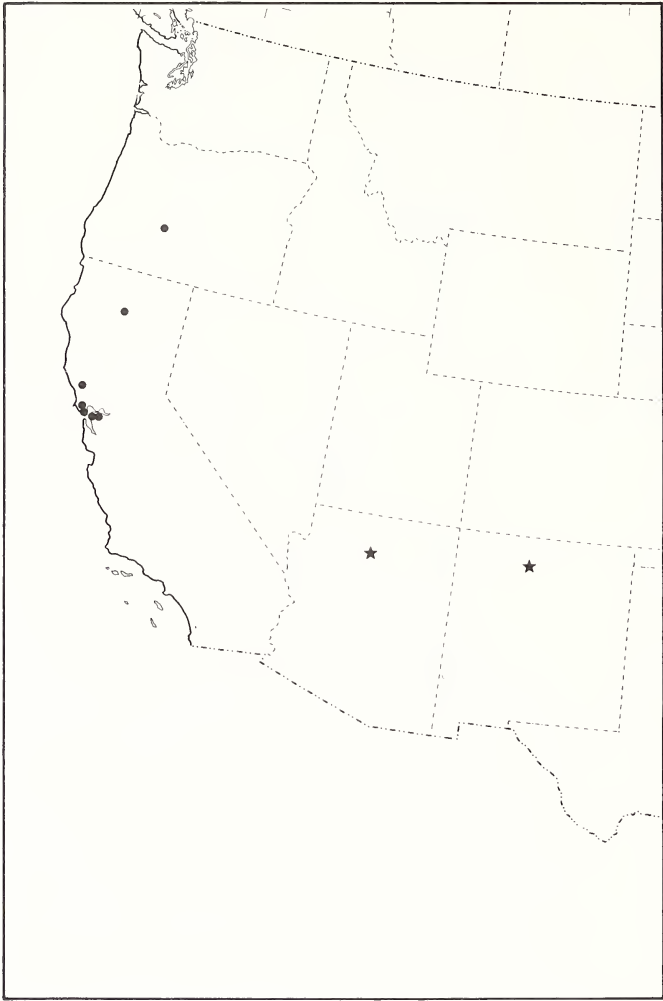


Fig. 180. Distribution. *Scymnus (P.) neomexicanus* (star); *S. P. nuttingi* (dot).

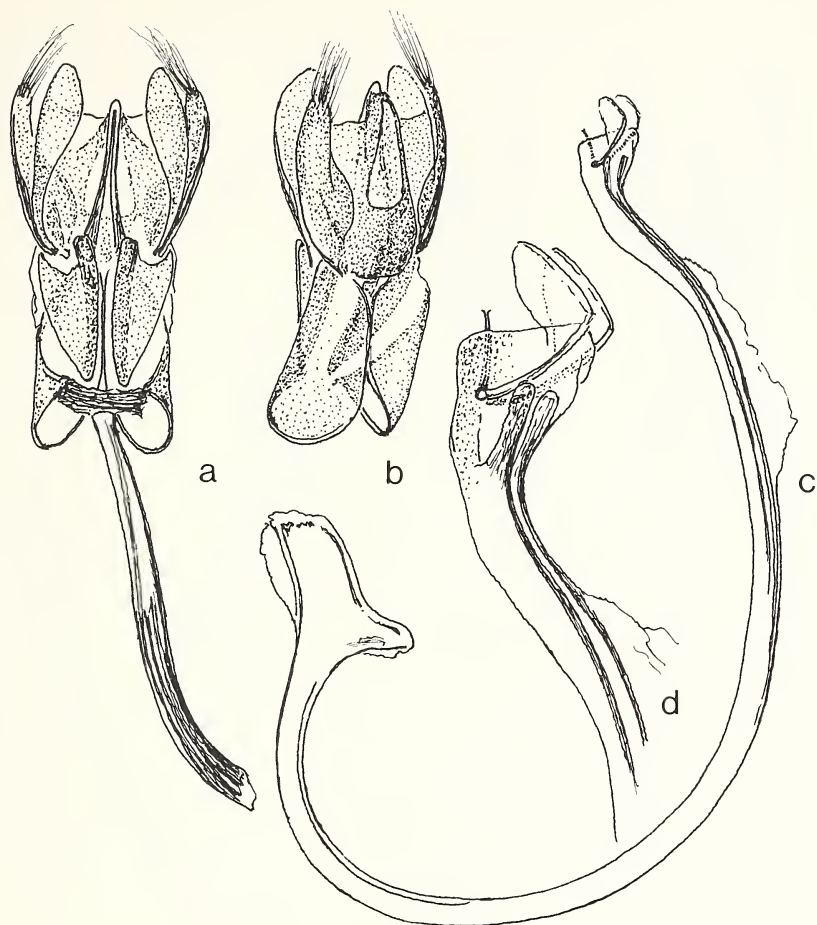


Fig. 181. *Scymnus (P.) nuttingi*.

Scymnus (Pullus) nuttingi Gordon
Fig. 181a-d; Map, Fig. 180

Scymnus (Pullus) nuttingi Gordon, 1976b, p. 204.

For detailed description, and discussion see Gordon, 1976b, p. 204.

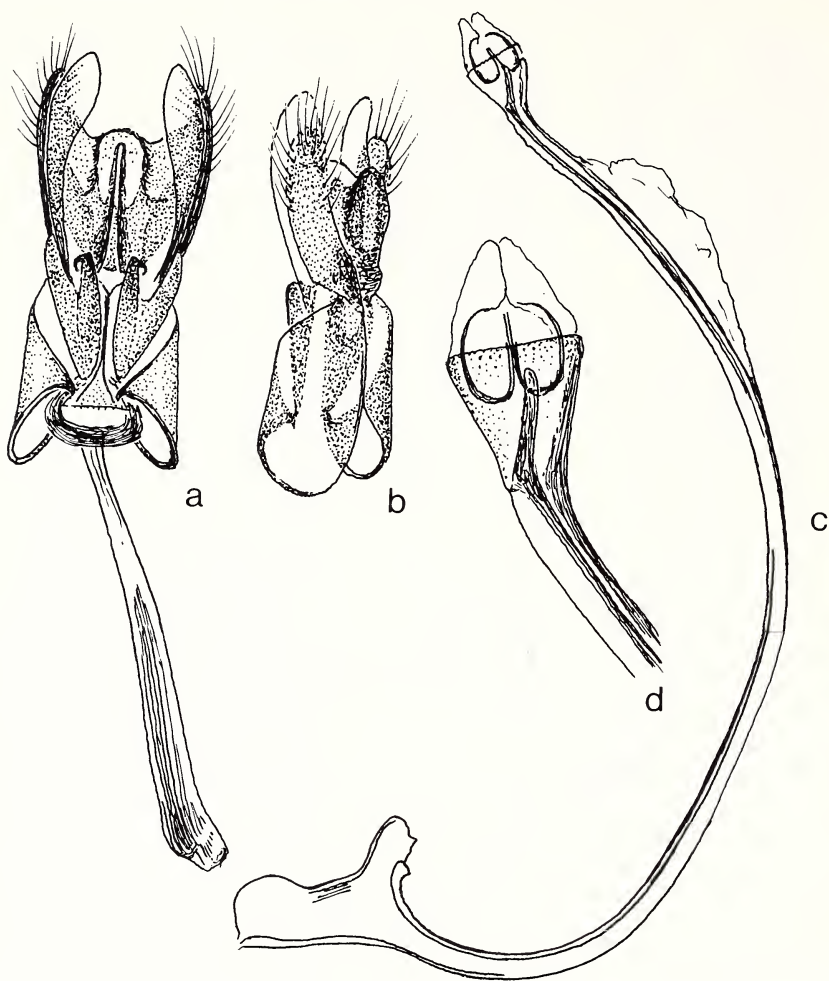


Fig. 182. *Scymnus* (P.) *compar*.

Scymnus (Pullus) *compar* Casey
Fig. 182a-d; Map, Fig. 183

Scymnus (Pullus) *compar* Casey, 1899, p. 148.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 156.—J. Chapin, 1974, p. 33.—Gordon, 1976b, p. 206.

Scymnus (Pullus) *vicksburgicus* Casey, 1924, p. 175.—Leng and Mutchler, 1927, p. 33.—Korschevsky, 1931, p. 167.—Gordon, 1976b, p. 206.

Scymnus (Pullus) *impunctus* Wingo, 1952, p. 35.—J. Chapin, 1974, p. 33.—Gordon, 1976b, p. 207.

For detailed description, and discussion see Gordon, 1976b, p. 206.



Fig. 183. Distribution. *Scymnus (P.) compar.*

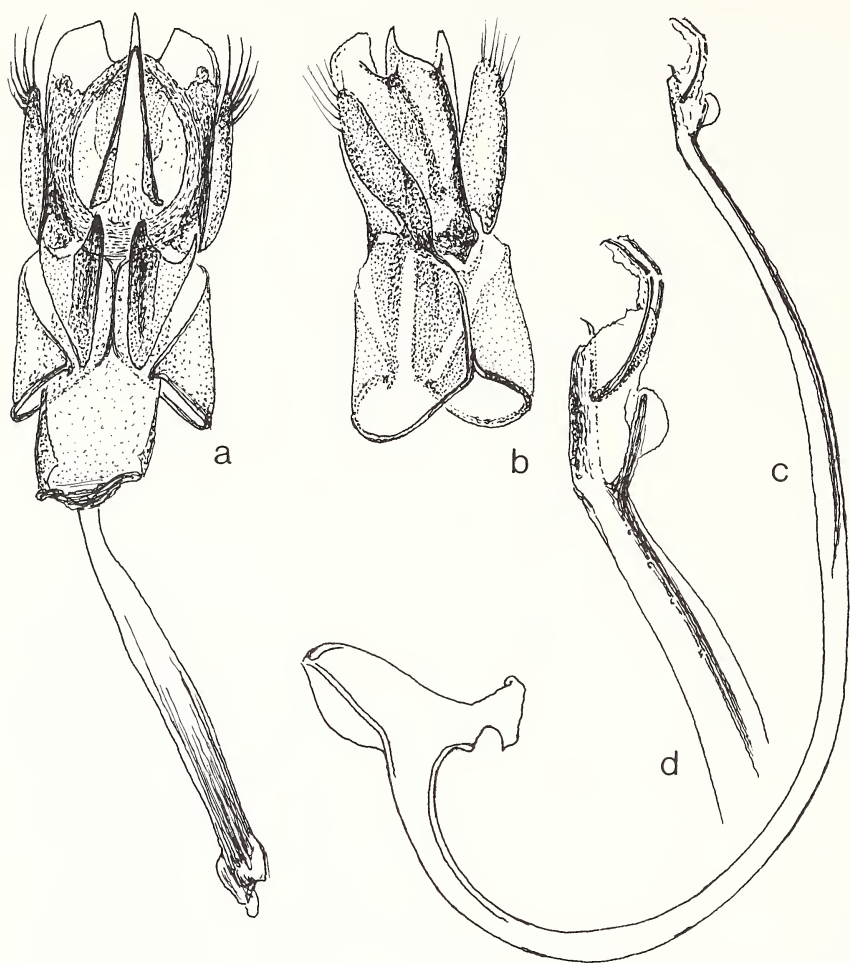


Fig. 184. *Scymnus (P.) impletus*.

Scymnus (Pullus) impletus Gordon

Fig. 184a-d; Map, Fig. 185

Scymnus (Pullus) impletus Gordon, 1976b, p. 209.

For detailed description, and discussion see Gordon, 1976b, p. 209.



Fig. 185. Distribution. *Scymnus (P.) impletus* (shaded, peripheral localities dotted); *S. (P.) simulans* (star); *S. (P.) wingoi* (rectangle).

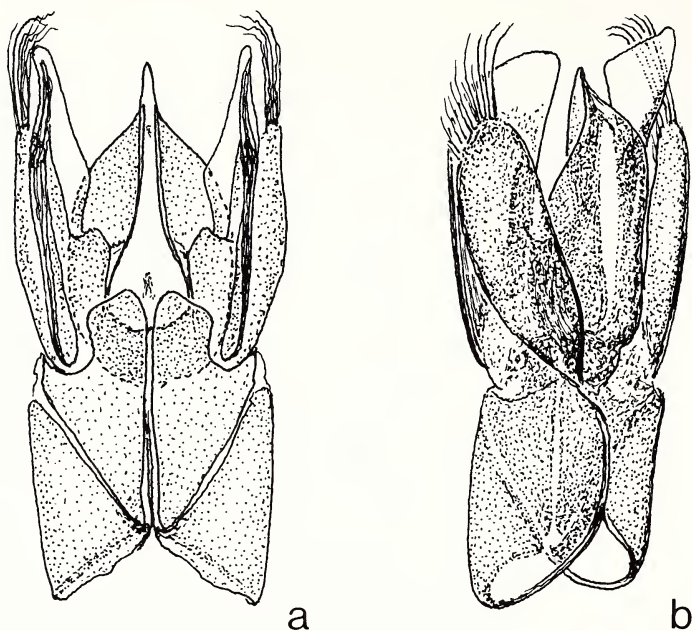


Fig. 186. *Scymnus (P.) simulans*.

Scymnus (Pullus) simulans Gordon

Fig. 186a, b; Map, Fig. 185

Scymnus (Pullus) simulans Gordon, 1976b, p. 214.

For detailed description, and discussion see Gordon, 1976b, p. 214.

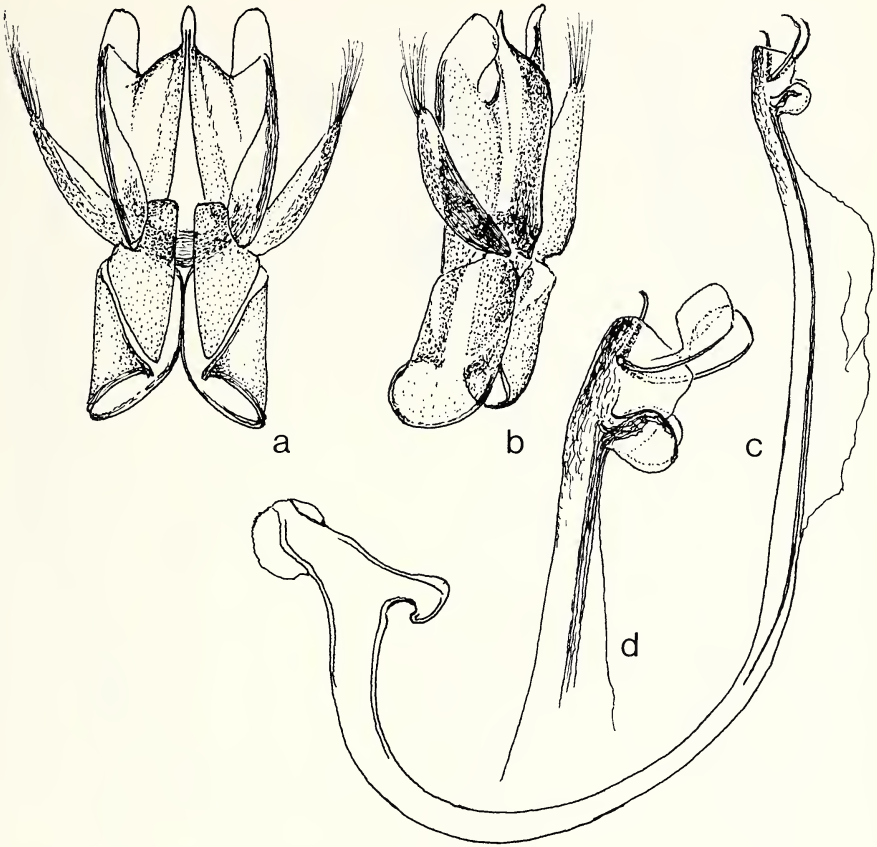


Fig. 187. *Scymnus (P.) wingoi*.

Scymnus (Pullus) wingoi Gordon

Fig. 187a-d; Map, Fig. 185

Scymnus (Pullus) wingoi Gordon, 1976b, p. 215.

For detailed description, and discussion see Gordon, 1976b, p. 215.

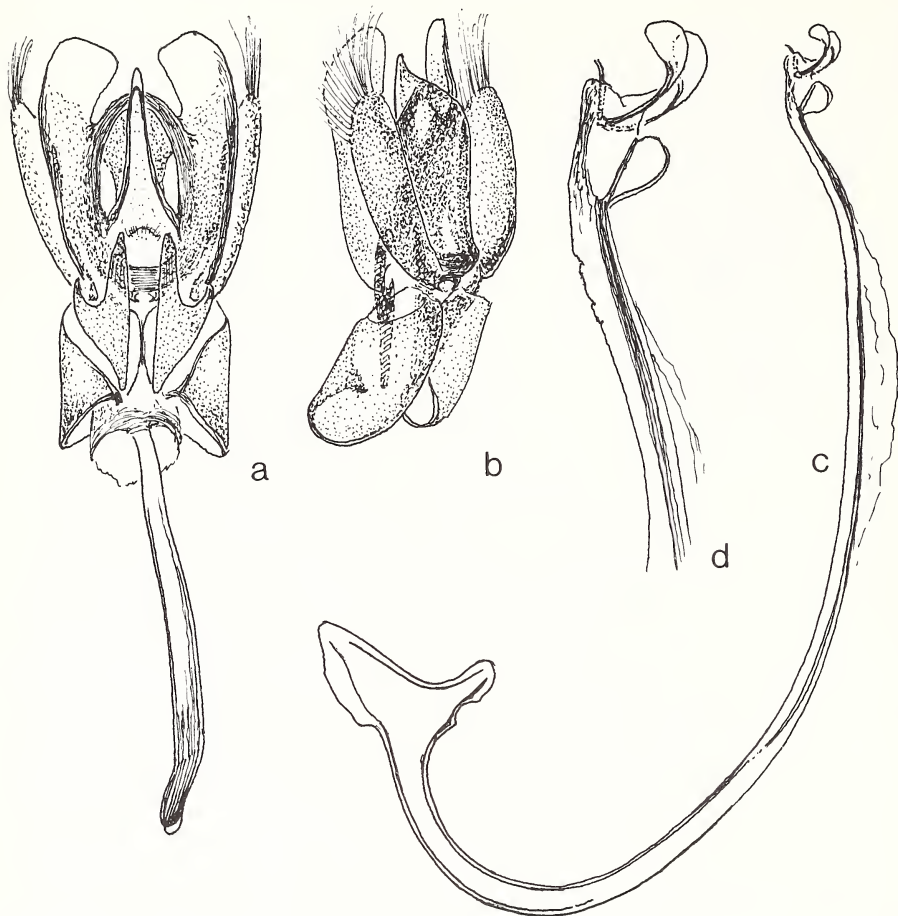


Fig. 188. *Scymnus (P.) abbreviatus*.

Scymnus (Pullus) abbreviatus LeConte

Fig. 188a-d; Map, Fig. 189

Scymnus abbreviatus LeConte, 1852, p. 140.—Crotch, 1874b, p. 268.—Horn, 1895, p. 104.

Scymnus (Pullus) abbreviatus: Casey, 1899, p. 153.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 153.—Gordon, 1976b, p. 216.

For detailed description, and discussion see Gordon, 1976b, p. 216.

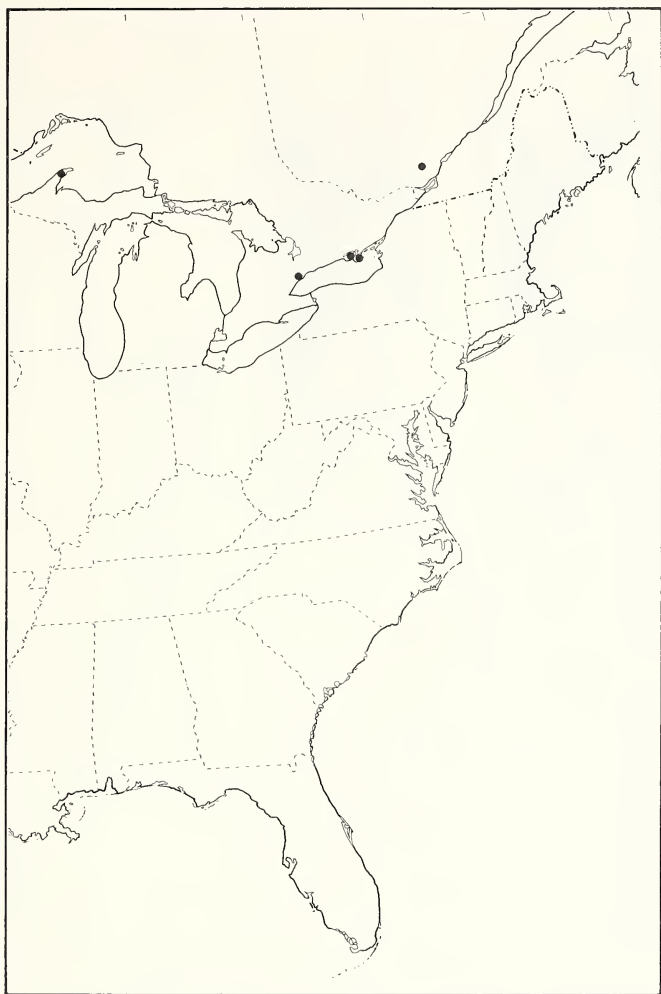


Fig. 189. Distribution. *Scymnus (P.) abbreviatus*.

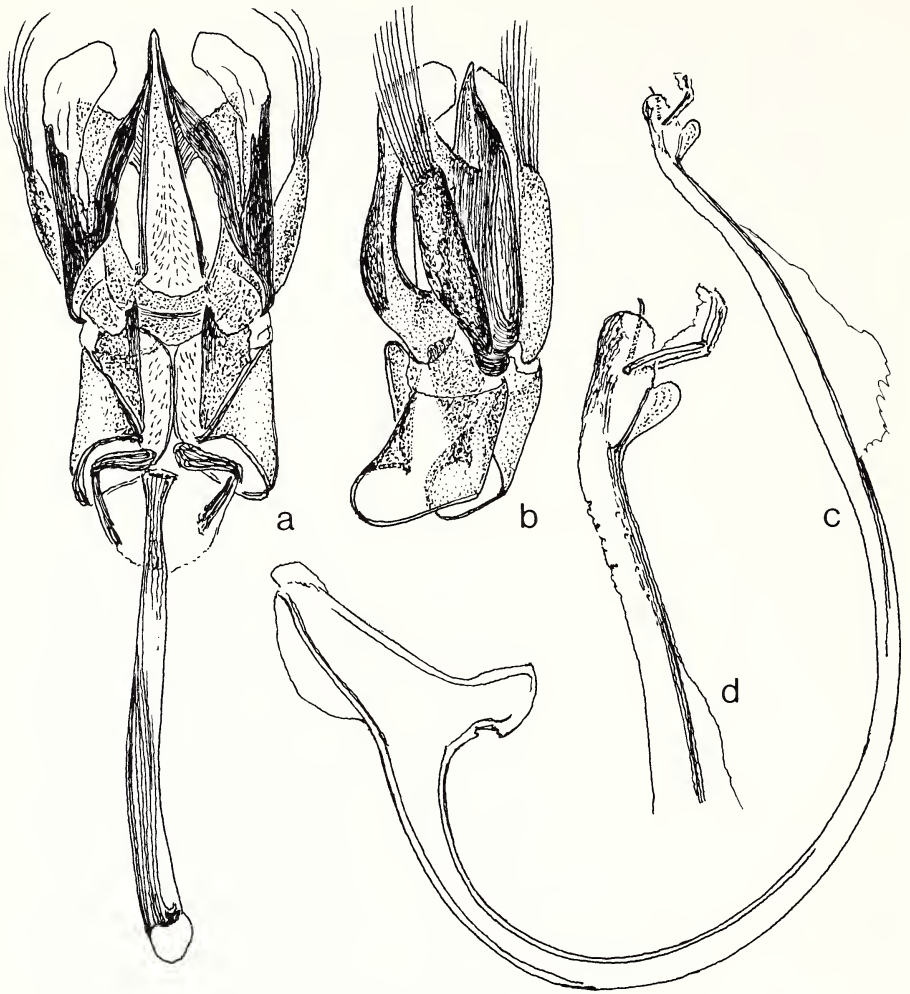


Fig. 190. *Scymnus (P.) tenebricus*.

Scymnus (Pullus) tenebricus Gordon
Fig. 190a-d; Map, Fig. 191

Scymnus (Pullus) tenebricus Gordon, 1976b, p. 220.

For detailed description, and discussion see Gordon, 1976b, p. 220.

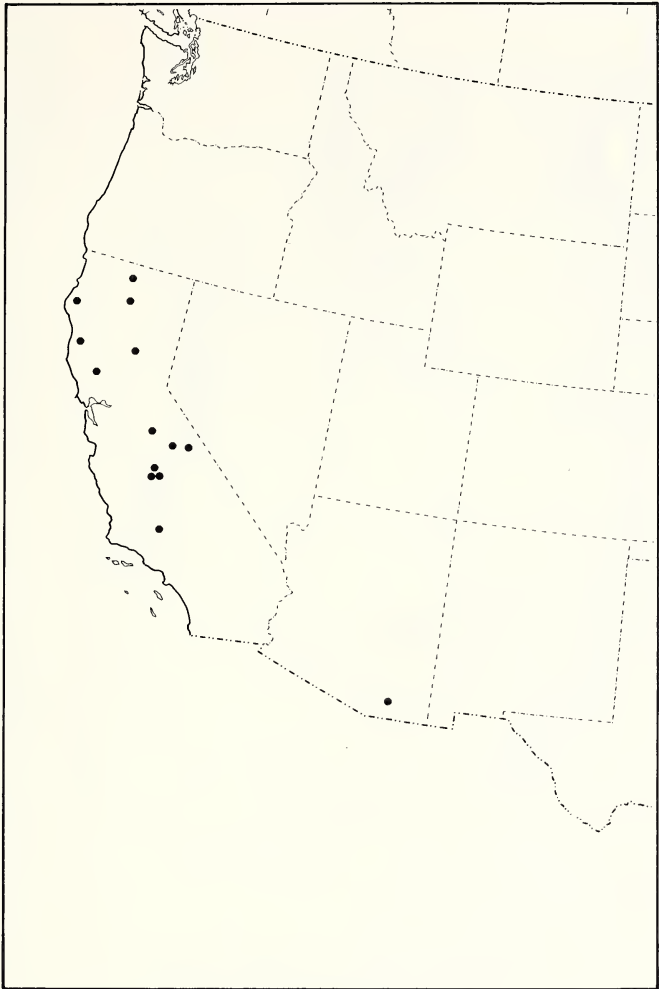


Fig. 191. Distribution. *Scymnus (P.) tenebricus*.

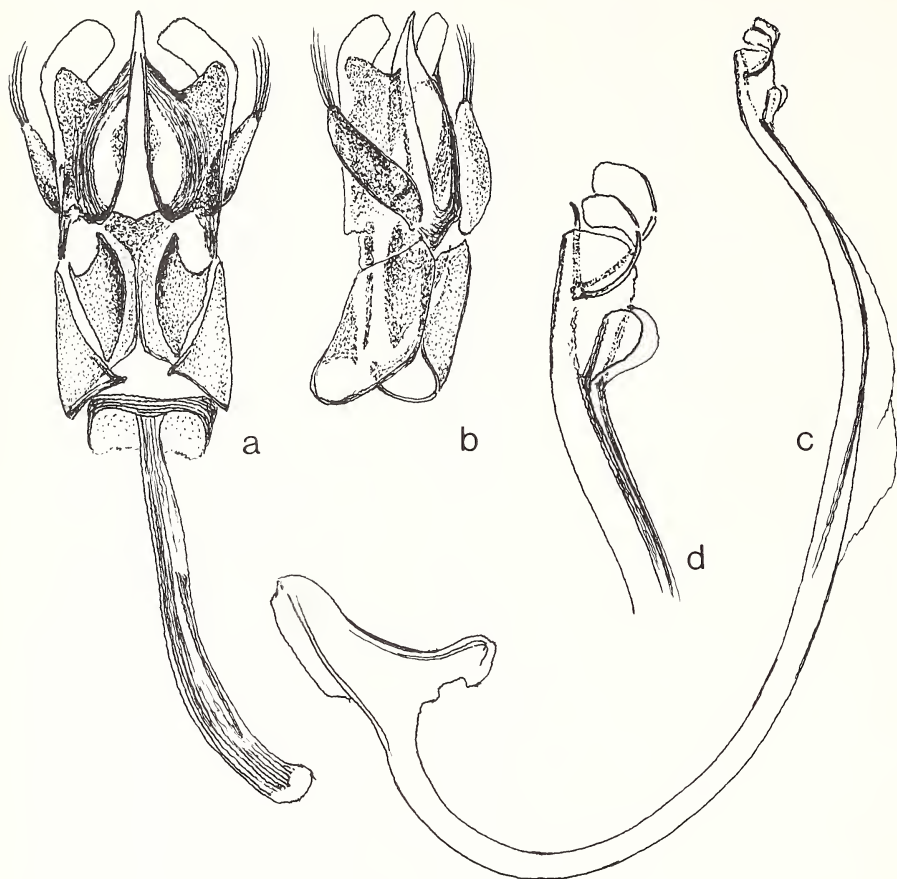


Fig. 192. *Scymnus (P.) wickhami*.

Scymnus (Pullus) wickhami Gordon

Fig. 192a-d; Map, Fig. 193

Scymnus (Pullus) wickhami Gordon, 1976b, p. 223.

For detailed description, and discussion see Gordon, 1976b, p. 223.

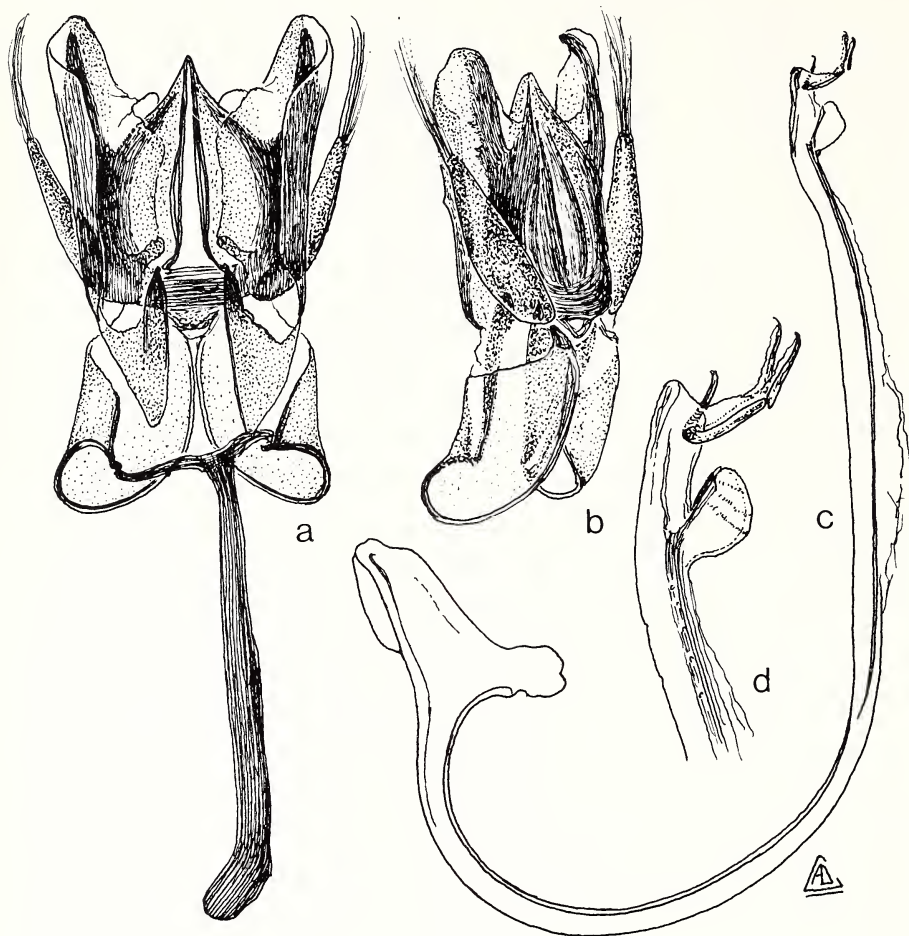


Fig. 194. *Scymnus (P.) elusivus*.

Scymnus (Pullus) elusivus Gordon

Fig. 194a-d; Map, Fig. 193

Scymnus (Pullus) elusivus Gordon, 1976b, p. 226.

For detailed description, and discussion see Gordon, 1976b, p. 226.

Additional locality record: CALIFORNIA: San Diego Co., Julian.

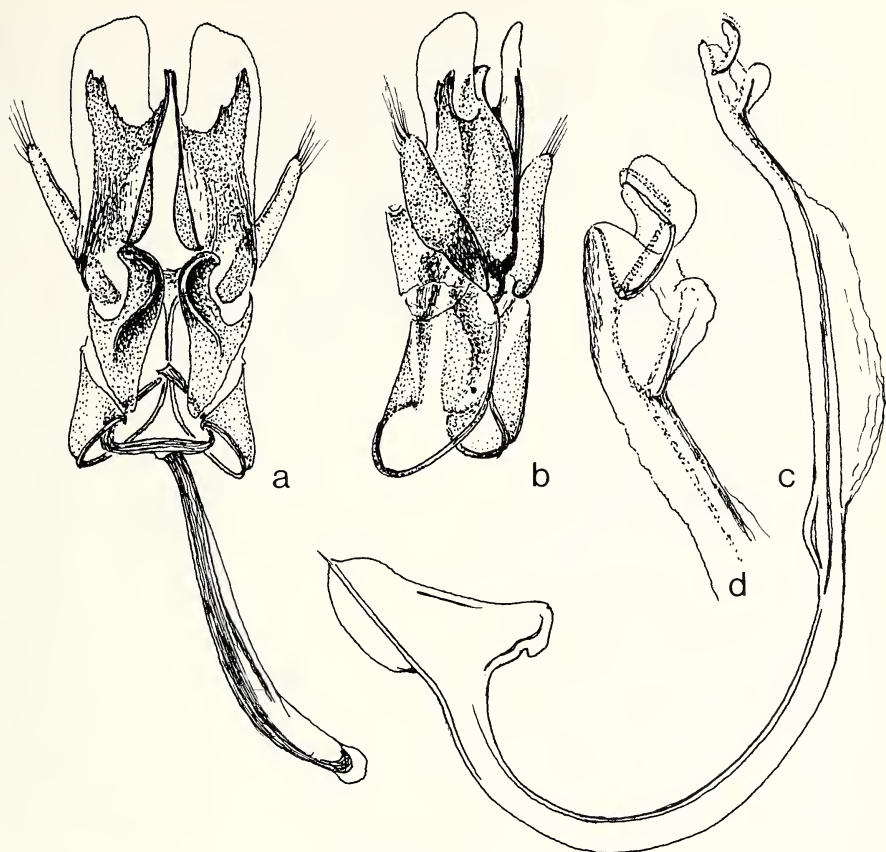


Fig. 195. *Scymnus (P.) uteanus*.

Scymnus (Pullus) uteanus Casey

Fig. 195a-d; Map, Fig. 196

Scymnus (Pullus) uteanus Casey, 1899, p. 144.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 167.—Gordon, 1976b, p. 226.

Scymnus (Pullus) rhesus Casey, 1899, p. 144.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 165.—Gordon, 1976b, p. 228.

For detailed description, and discussion see Gordon, 1976b, p. 226.



Fig. 196. Distribution. *Scymnus (P.) uteanus* (dot); *S. (P.) papago* (star).

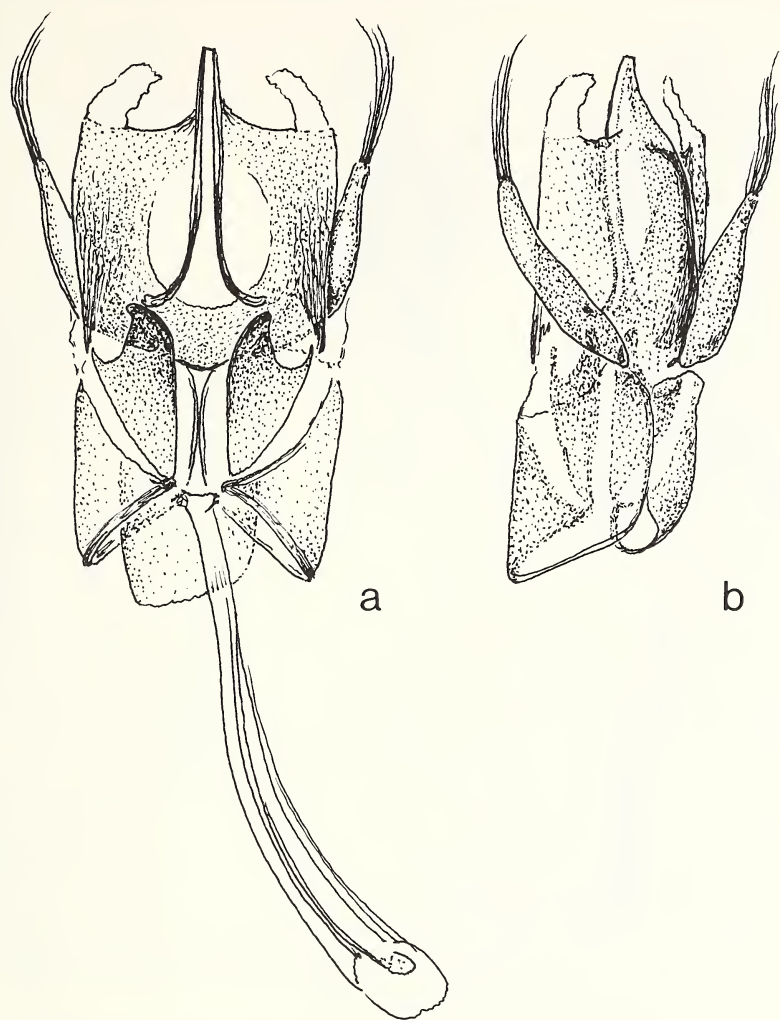


Fig. 197. *Scymnus (P.) papago*.

Scymnus (Pullus) papago Casey
Fig. 197a, b; Map., Fig. 196

Scymnus (Pullus) papago Casey, 1899, p. 151.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 164.—Gordon, 1976b, p. 230.

For detailed description, and discussion see Gordon, 1976b, p. 230.

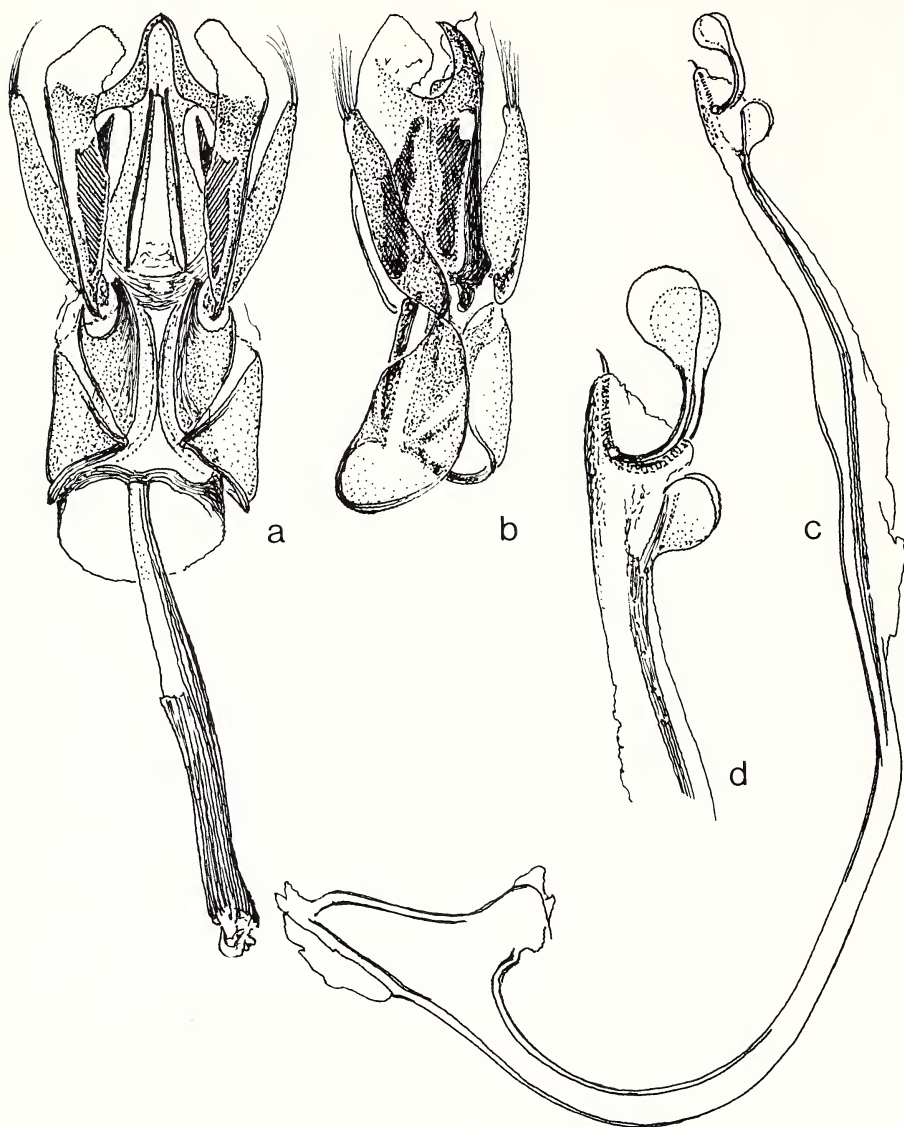


Fig. 198. *Scymnus (P.) uncus*.

Scymnus (Pullus) uncus Wingo

Fig. 198a-d; Map, Fig. 199

Scymnus (Pullus) uncus Wingo, 1952, p. 38.—J. Chapin, 1974, p. 32.—Gordon, 1976b, p. 232.

For detailed description, and discussion see Gordon, 1976b, p. 232.



Fig. 199. Distribution. *Scymnus (P.) uncus*.

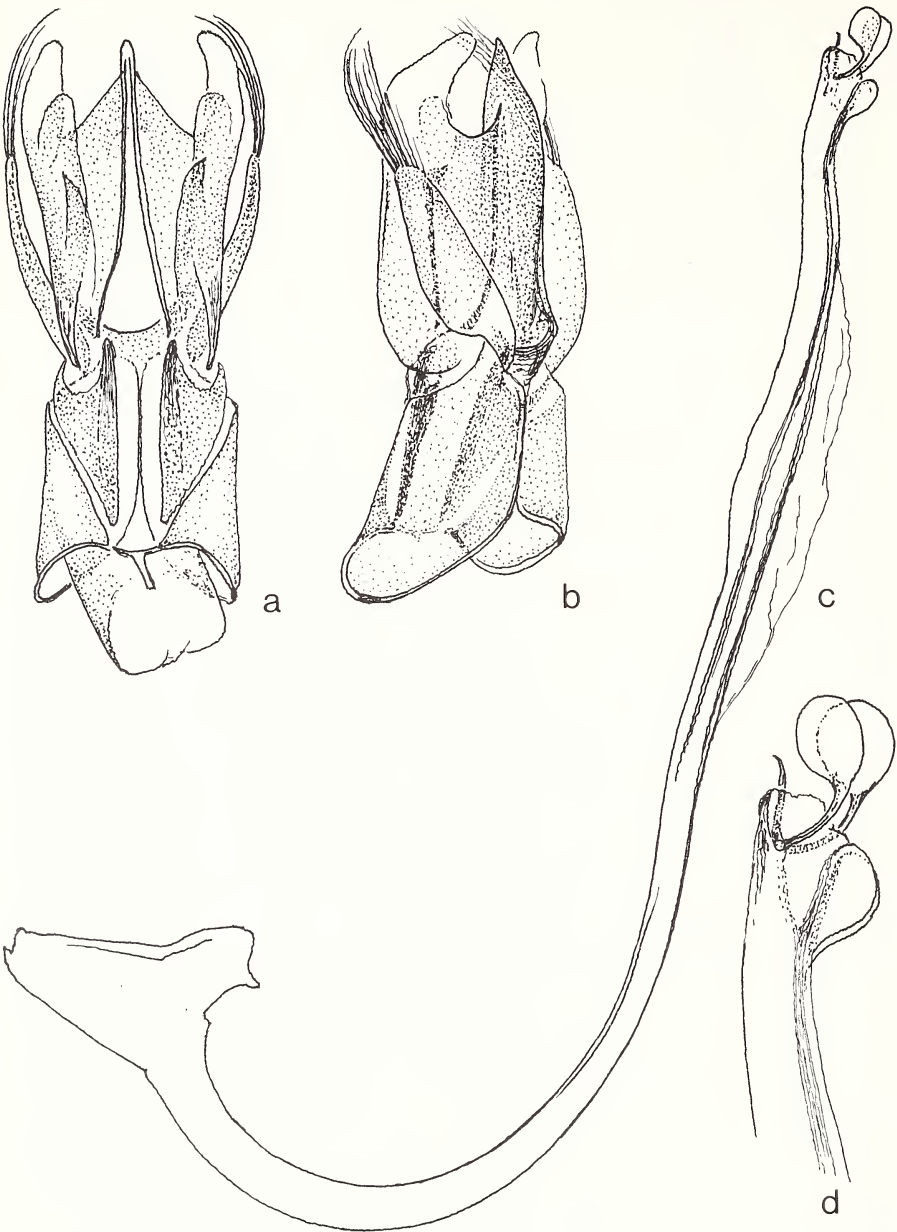


Fig. 200. *Scymnus (P.) puncticollis*.

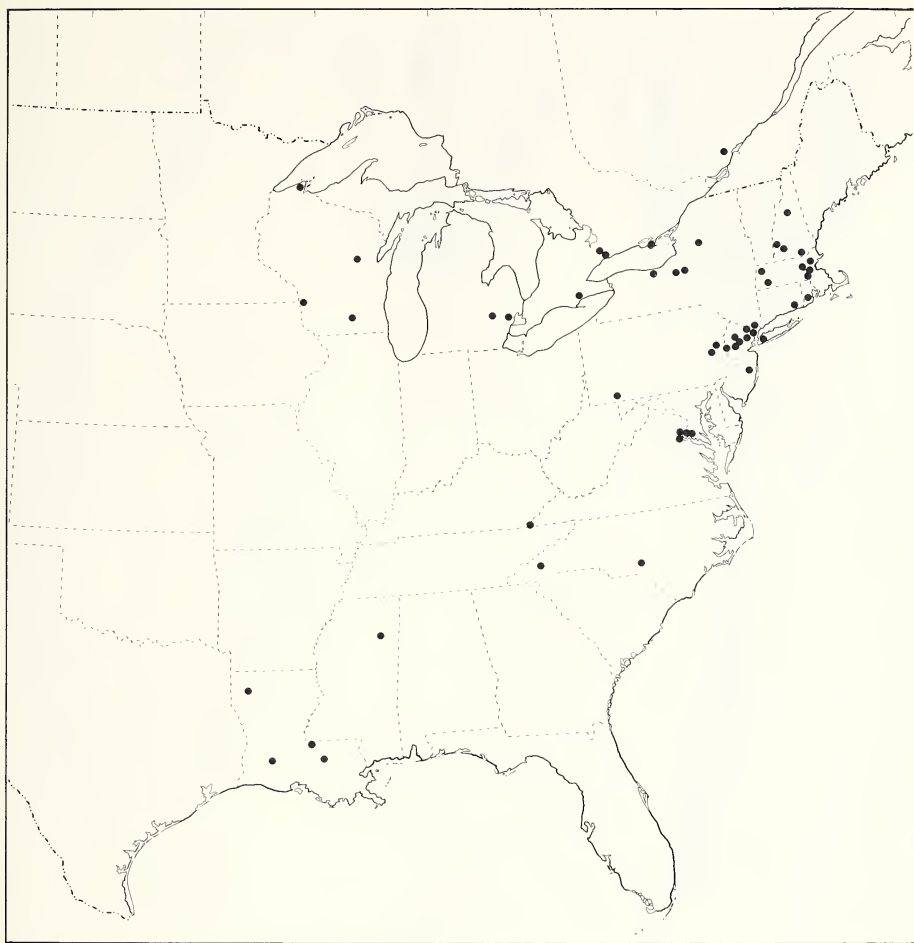


Fig. 201. Distribution. *Scymnus (P.) puncticollis*.

Scymnus (Pullus) puncticollis LeConte

Fig. 200a-d; Map, Fig. 201

Scymnus puncticollis LeConte, 1852, p. 139.—Crotch, 1874b, p. 266.—Horn, 1895, p. 102.

Scymnus (Pullus) puncticollis: Casey, 1899, p. 160.—Leng, 1920, p. 133.—Korschefsky, 1931, p. 165.—Wingo, 1952, p. 37.—J. Chapin, 1974, p. 31.—Gordon, 1976b, p. 232.

For detailed description, and discussion see Gordon, 1976b, p. 232.

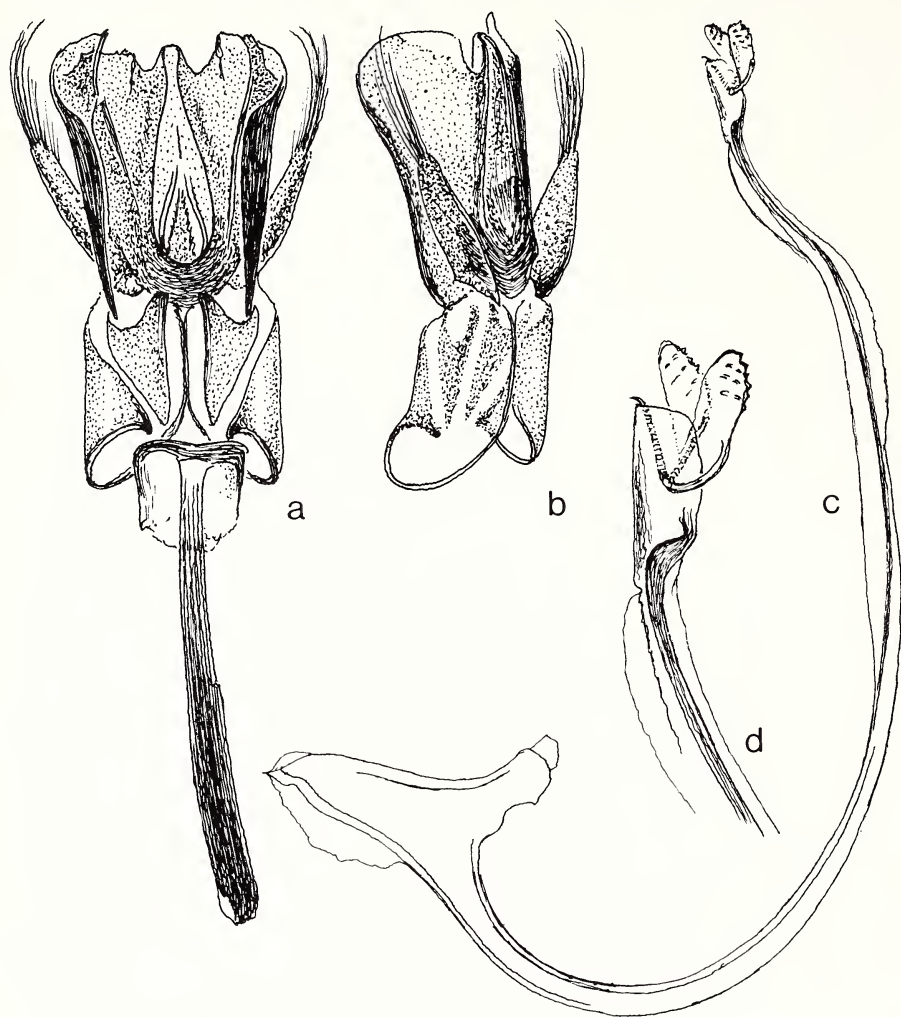


Fig. 202. *Scymnus (P.) weidti*.

Scymnus (Pullus) weidti Casey

Fig. 202a-d; Map, Fig. 203

Scymnus (Pullus) weidti Casey, 1899, p. 149.—Leng, 1920, p. 213.—Casey, 1924, p. 176.—Korschevsky, 1931, p. 167.—Gordon, 1976b, p. 237.

For detailed description, and discussion see Gordon, 1976b, p. 237.

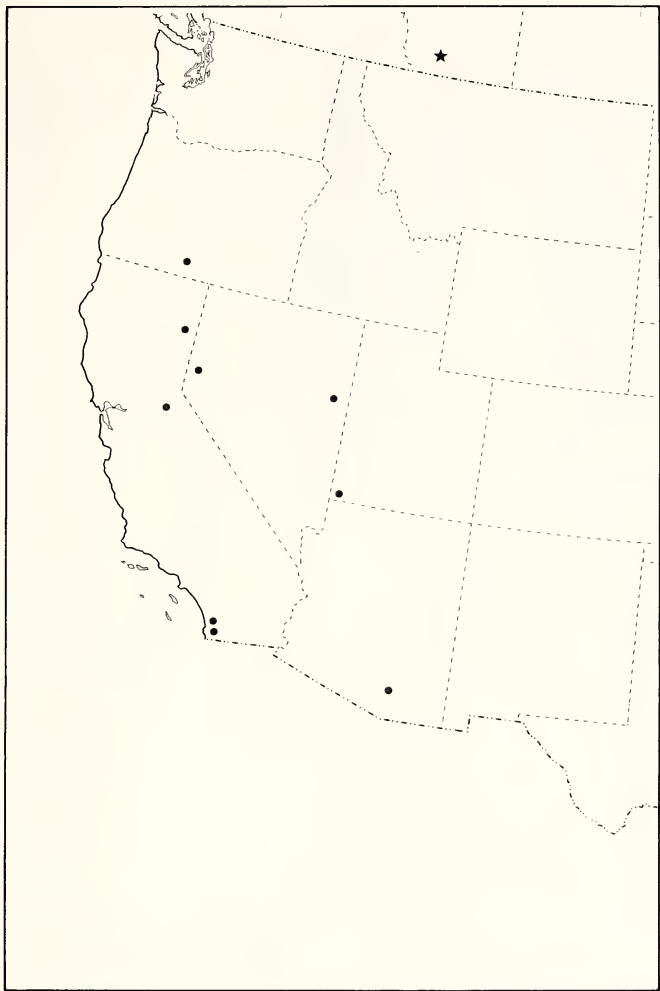


Fig. 203. Distribution. *Scymnus (P.) weidti* (dot); *S. (P.) aquilonarius* (star).

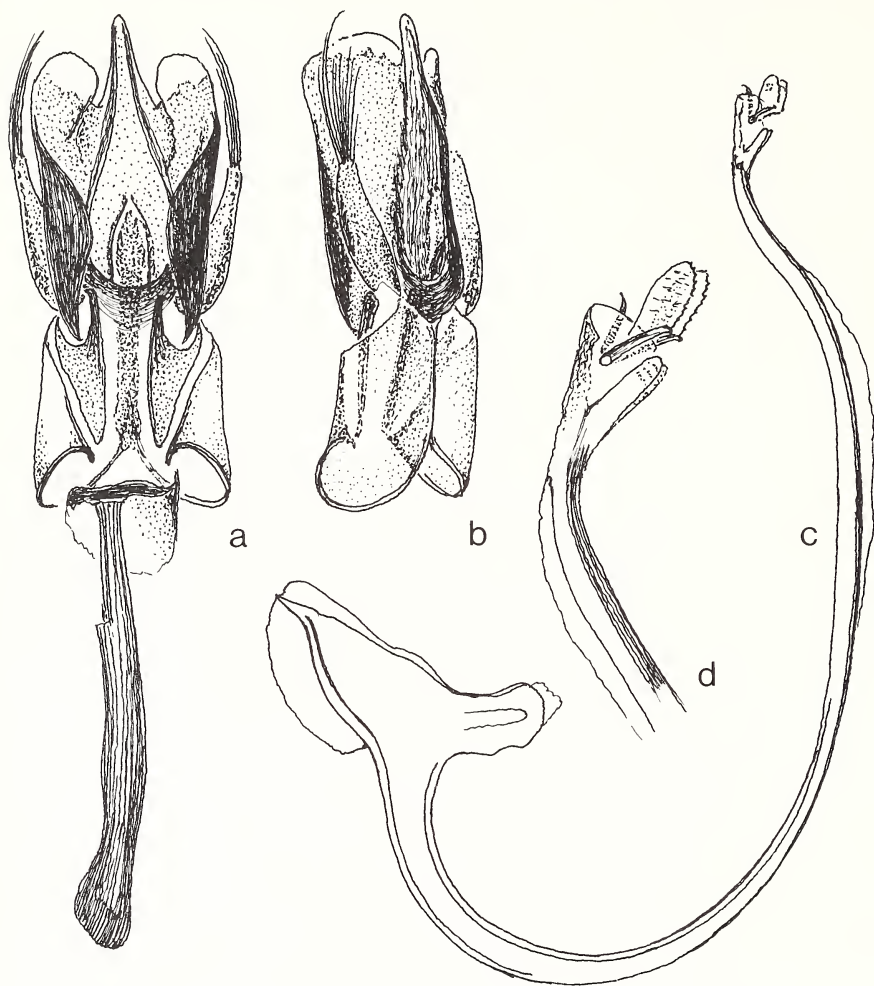


Fig. 204. *Scymnus* (*P.*) *aquilonarius*.

Scymnus (*Pullus*) *aquilonarius* Gordon
Fig. 204a-d; Map, Fig. 203

Scymnus (*Pullus*) *aquilonarius* Gordon, 1976b, p. 240.—Belicek, 1976, p. 305.

For detailed description, and discussion see Gordon, 1976b, p. 240.

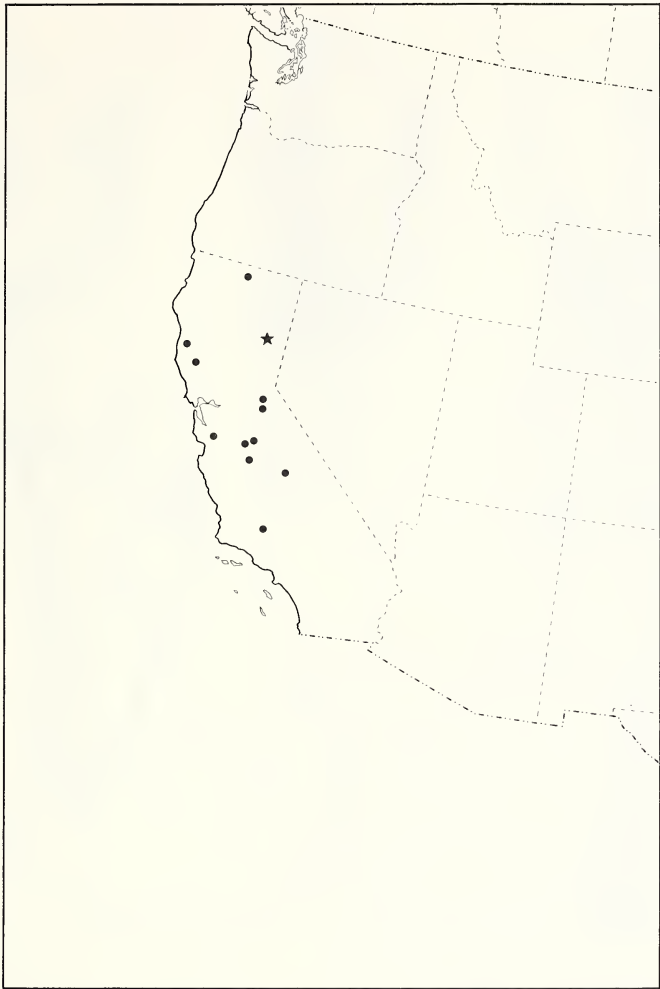


Fig. 205. Distribution. *Scymnus (P.) martini* (star); *S. (P.) hesperius* (dot).

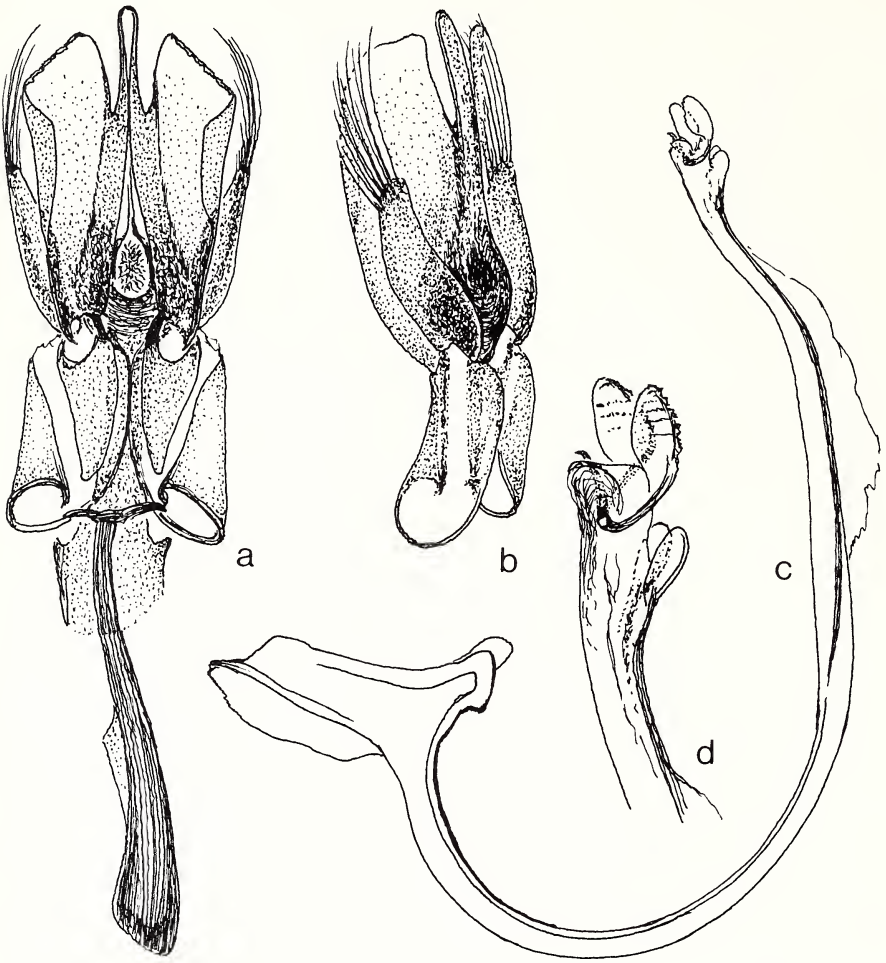


Fig. 206. *Scymnus (P.) martini*.

Scymnus (Pullus) martini Gordon
Fig. 206a-d; Map, Fig. 205

Scymnus (Pullus) martini Gordon, 1976b, p. 240.

For detailed description, and discussion see Gordon, 1976b, p. 240.

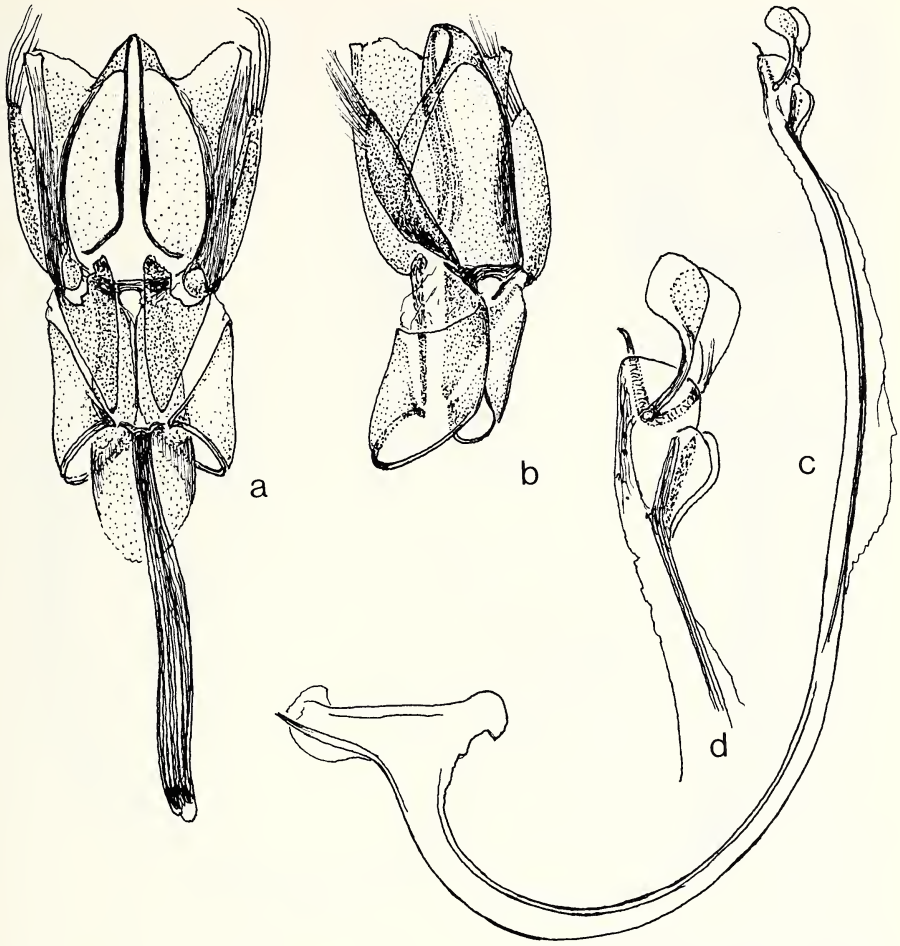


Fig. 207. *Scymnus (P.) hesperius*.

Scymnus (Pullus) hesperius Gordon
Fig. 207a-d; Map, Fig. 205

Scymnus (Pullus) hesperius Gordon, 1976b, p. 243.

For detailed description, and discussion see Gordon, 1976b, p. 243.

Additional locality record: CALIFORNIA: Eldorado Co., Pollock Pines.

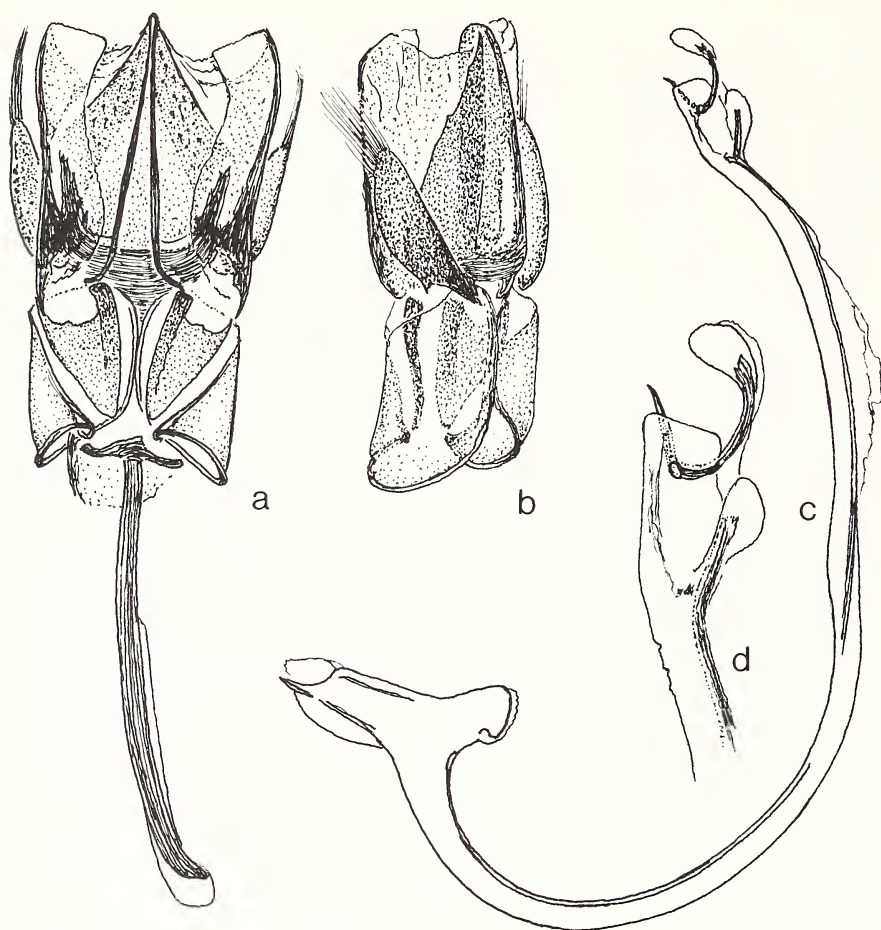


Fig. 208. *Scymnus (P.) luctuosus*.

Scymnus (Pullus) luctuosus Casey

Fig. 208a-d; Map, Fig. 209

Scymnus (Pullus) luctuosus Casey, 1899, p. 146.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 161.—Gordon, 1976b, p. 245.

Scymnus (Pullus) sonomae Casey, 1899, p. 147.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 166.—Gordon, 1976b, p. 245.

Scymnus (Pullus) advena Casey, 1899, p. 147.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 153.—Gordon, 1976b, p. 245.

For detailed description, and discussion see Gordon, 1976b, p. 245.

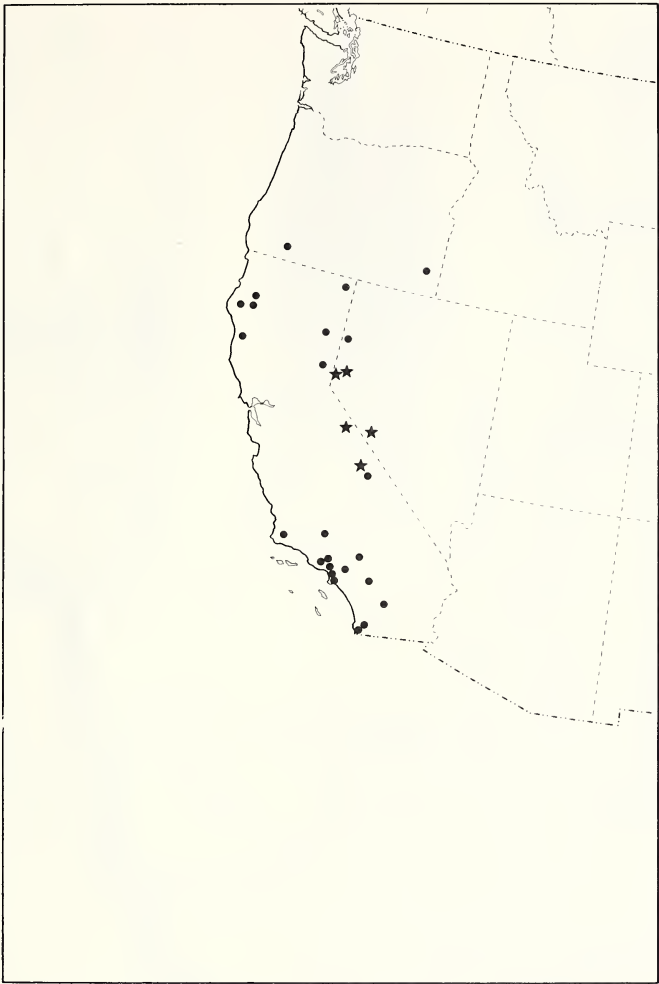


Fig. 209. Distribution. *Scymnus (P.) luctuosus* (dot); *S. (P.) nevadensis* (star).

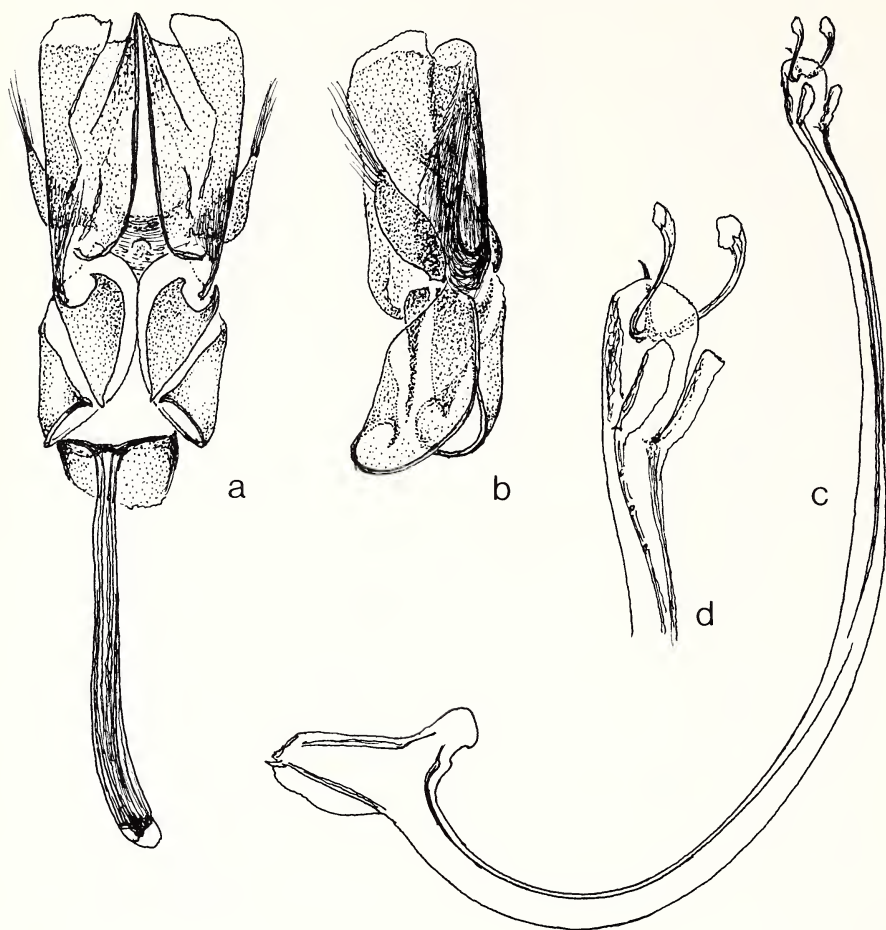


Fig. 210. *Scymnus* (*P.*) *nevadensis*.

Scymnus (*Pullus*) *nevadensis* Weise
Fig. 210a-d; Map, Fig. 209

Scymnus nevadensis Weise, 1929, p. 33.—Leng and Mutchler, 1933, p. 35.

Scymnus (*Scymnus*) *nevadensis*: Korschefsky, 1931, p. 163.—Gordon, 1976b, p. 248.

Scymnus (*Scymnus*) *innocuus* Casey, 1899, p. 154 (not Boheman, 1859).—Leng, 1920, p. 214.

For detailed description, and discussion see Gordon, 1976b, p. 248.

Scymnus (*Pullus*) *lacustris* LeConte
Fig. 211a-d; Map, Fig. 212

Scymnus lacustris LeConte, 1850, p. 239.—LeConte, 1852, p. 140.—Crotch, 1874b, p. 268.—Horn, 1895, p. 105.

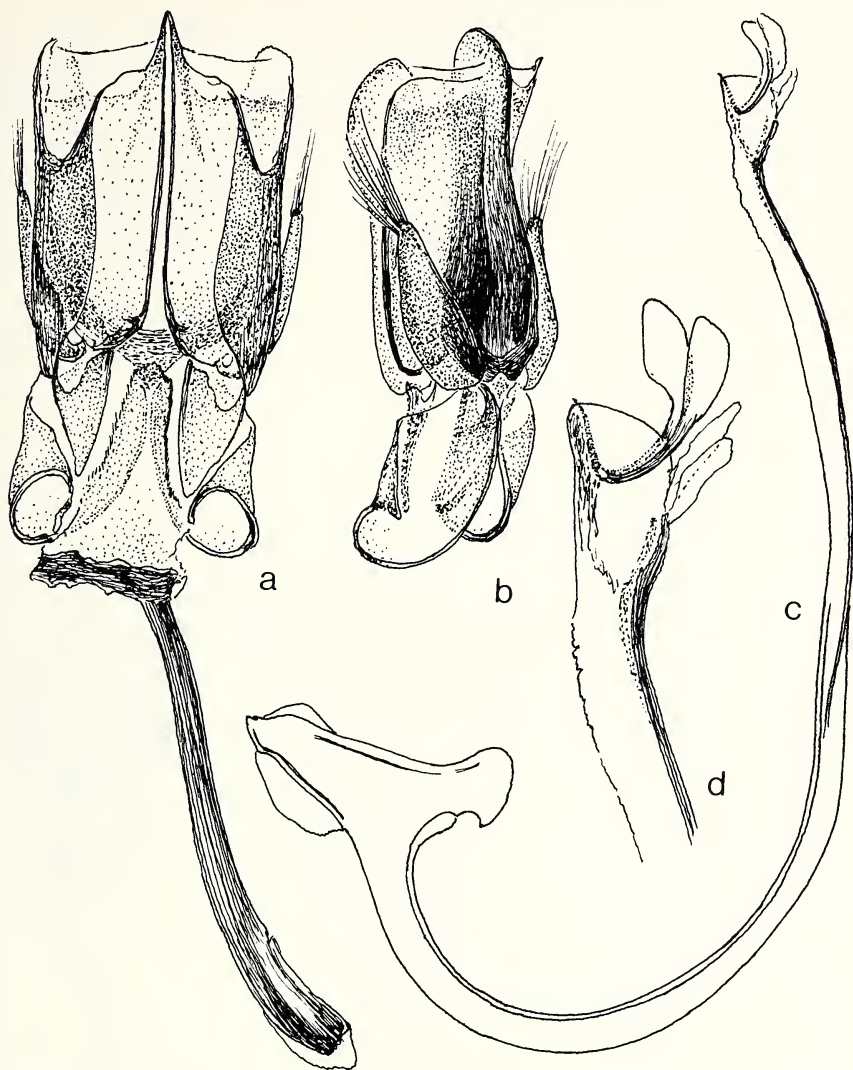


Fig. 211. *Scymnus* (*P.*) *lacustris*.

Scymnus (*Pullus*) *lacustris*: Mulsant, 1850, p. 989.—Mulsant, 1853, p. 153.—Casey, 1899, p. 149.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 160.—Hatch, 1961, p. 151.—Gordon, 1976b, p. 250.—Belicek, 1976, p. 305.

Scymnus (*Pullus*) *cultratus* Wingo, 1952, p. 38.—Gordon, 1976b, p. 250.

For detailed description, and discussion see Gordon, 1976b, p. 250.

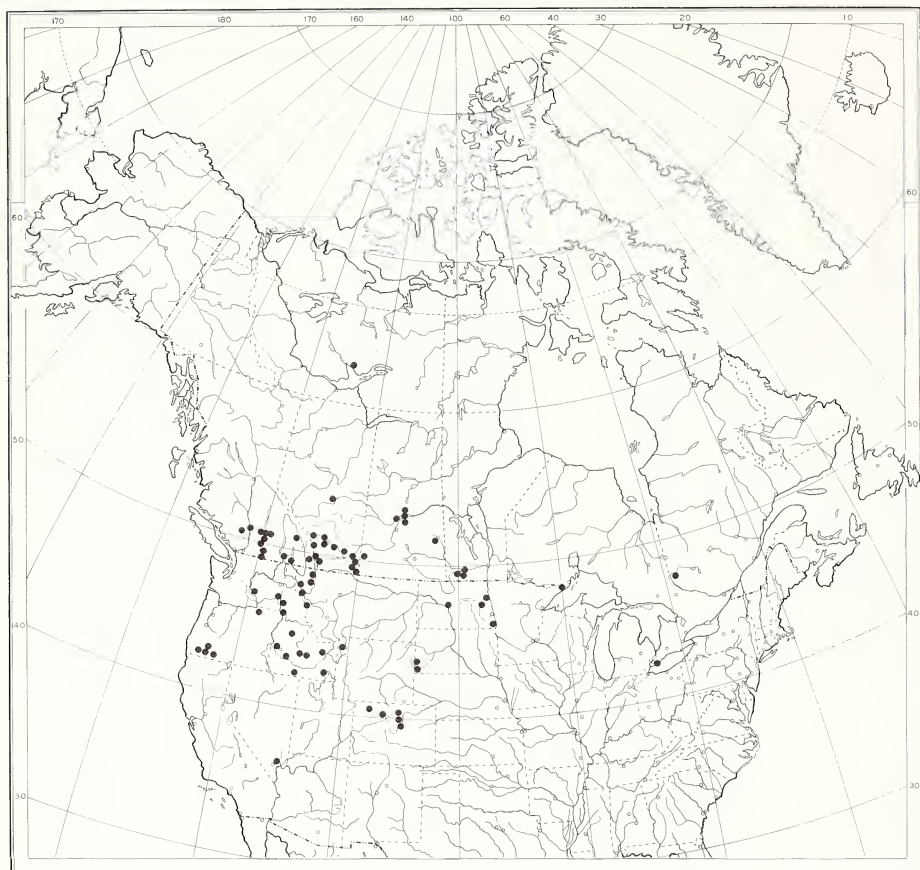


Fig. 212. Distribution. *Scymnus* (*P.*) *lacustris*.

Scymnus (*Pullus*) *tahoensis* Casey

Fig. 213a-h; Map, Fig. 214

Scymnus (*Pullus*) *tahoensis* Casey, 1899, p. 150.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 166.—Gordon, 1976b, p. 253.—Belicek, 1976, p. 305.

For detailed description, and discussion see Gordon, 1976b, p. 253.

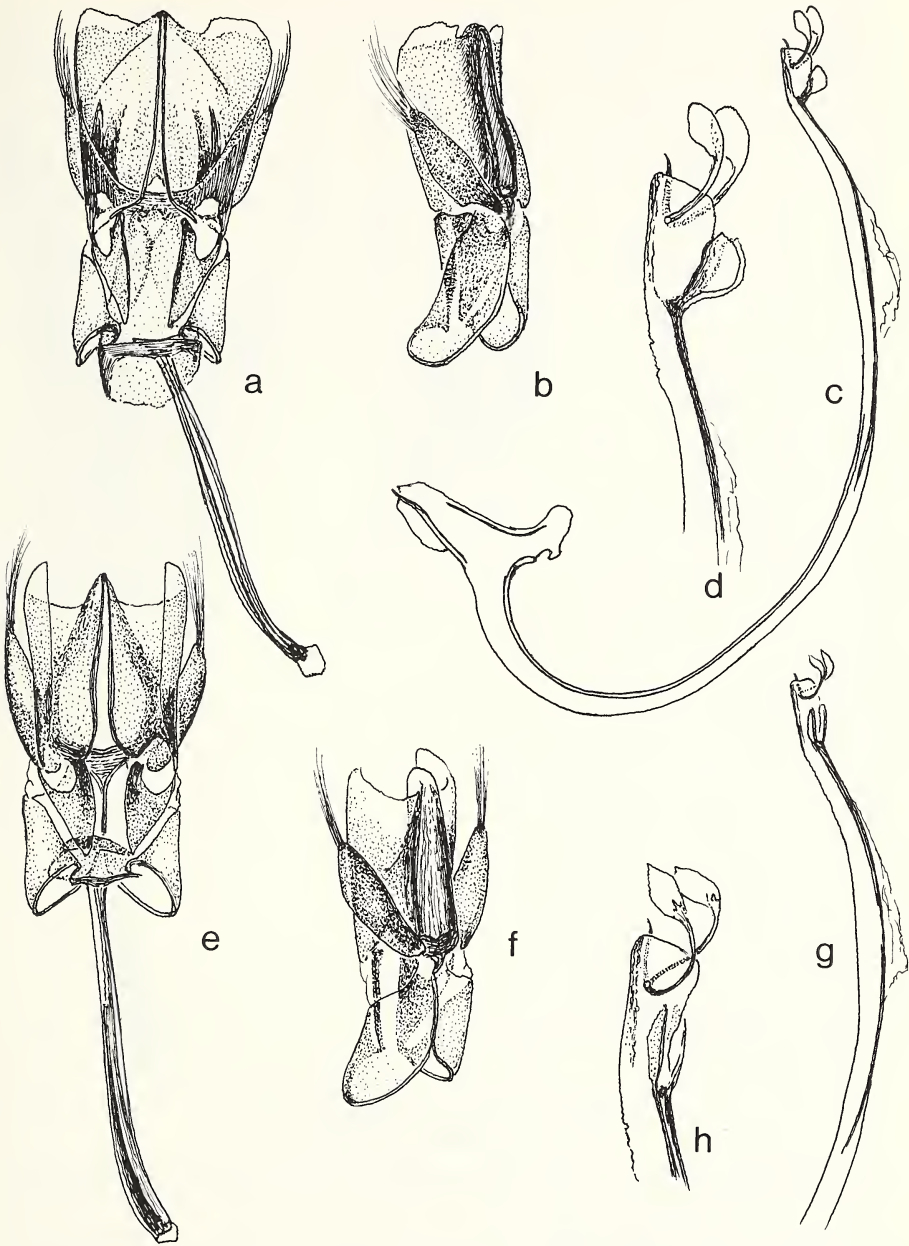


Fig. 213. *Scymnus (P.) tahoensis*.

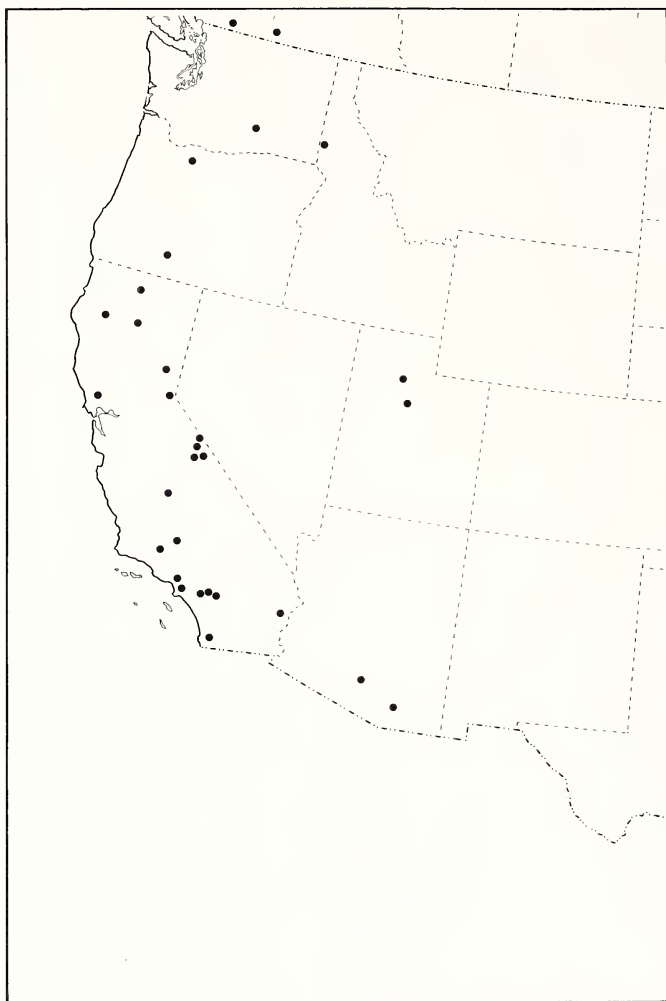


Fig. 214. Distribution. *Scymnus (P.) tahoensis*.

Scymnus (Pullus) caudalis LeConte

Fig. 215a-d; Map, Fig. 216

Scymnus caudalis LeConte, 1850, p. 238.—LeConte, 1852, p. 139.—Horn, 1895, p. 103.

Scymnus (Pullus) caudalis LeConte: Casey, 1899, p. 143.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 156.—Gordon, 1976b, p. 256.

Scymnus (Pullus) natchezianus Casey, 1899, p. 143.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 163.—Gordon, 1976b, p. 256.

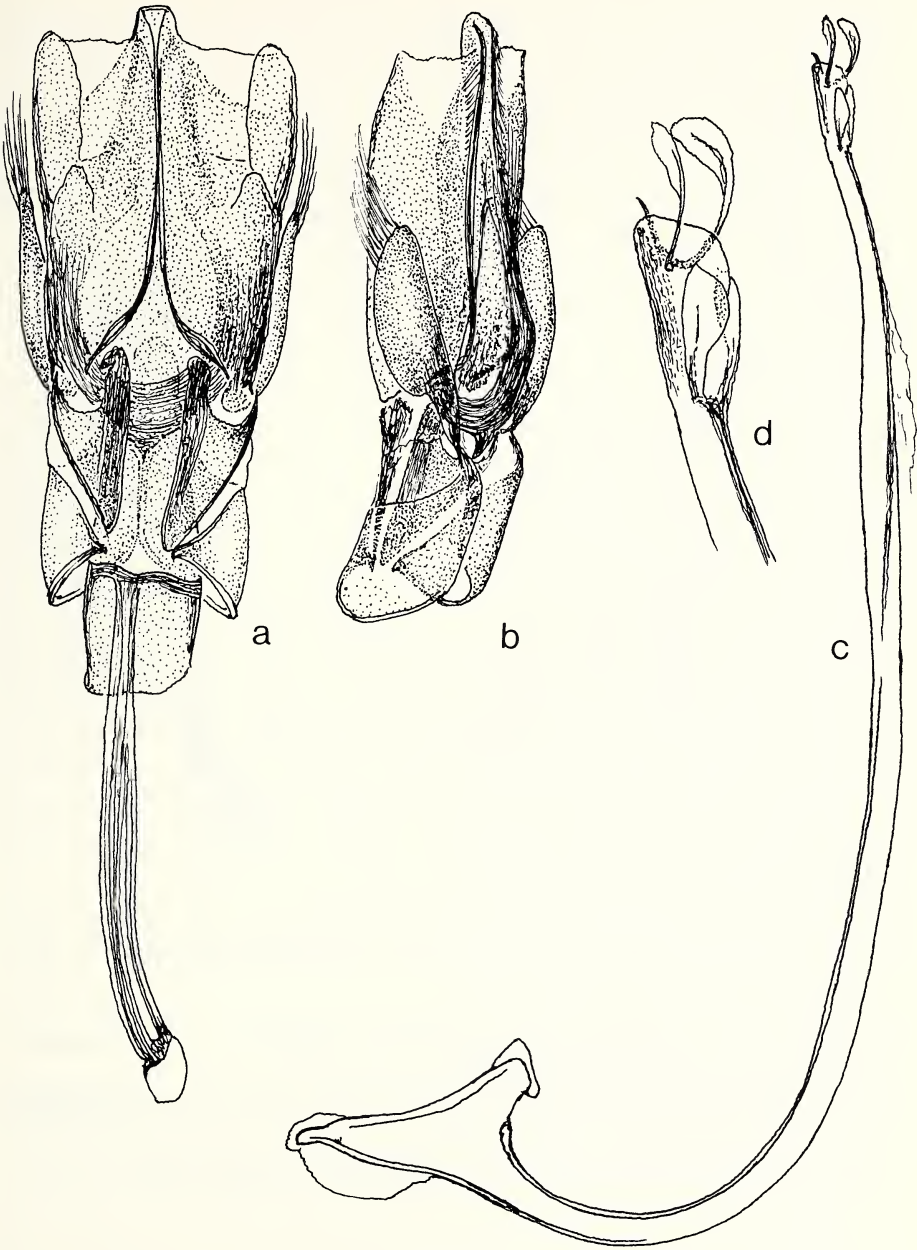


Fig. 215. *Scymnus (P.) caudalis*.



Fig. 216. Distribution. *Scymnus (P.) caudalis* (dot); *S. (P.) peninsularis* (star).

Scymnus (Pullus) indutus Casey, 1899, p. 145.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 160.—Gordon, 1976b, p. 256.

Scymnus (Pullus) agricola Casey, 1899, p. 145.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 153.—Gordon, 1976b, p. 256.

For detailed description, and discussion see Gordon, 1976b, p. 256.

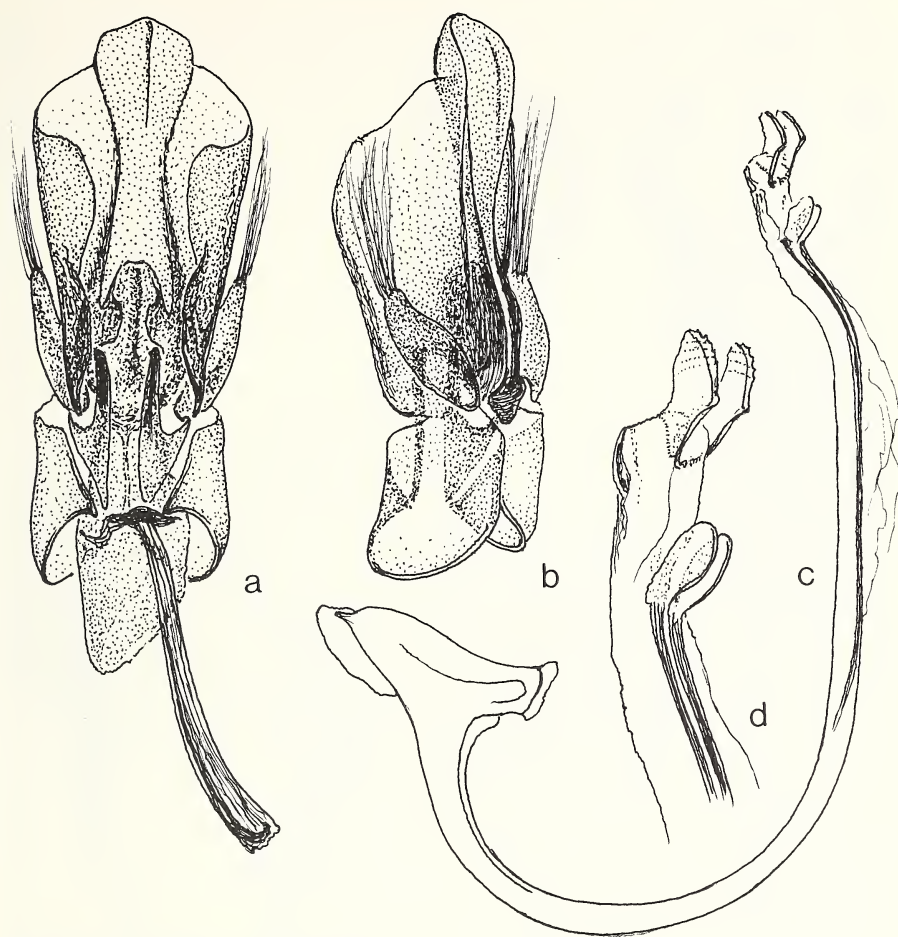


Fig. 217. *Scymnus (P.) peninsularis*.

Scymnus (Pullus) peninsularis Gordon
Fig. 217a-d; Map, Fig. 216

Scymnus (Pullus) peninsularis Gordon, 1976b, p. 259.

For detailed description, and discussion see Gordon, 1976b, p. 259.

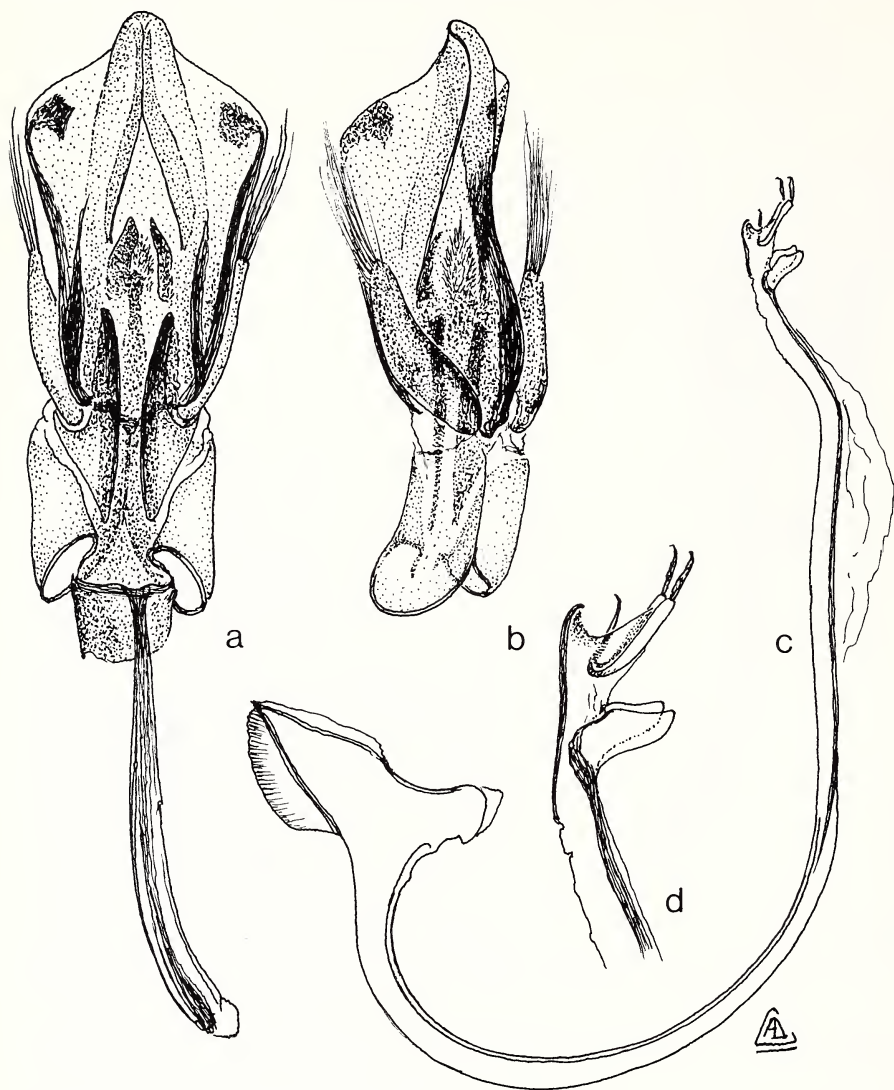


Fig. 218. *Scymnus (P.) creperus*.

Scymnus (Pullus) creperus Mulsant

Fig. 218a-d; Map, Fig. 219

Scymnus (Pullus) creperus Mulsant, 1850, p. 985.—Mulsant, 1853, p. 153.—Casey, 1899, p. 140.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 157.—J. Chapin, 1974, p. 28.—Gordon, 1976b, p. 260.

Scymnus creperus: LeConte, 1852, p. 139.—Crotch, 1874b, p. 265.—Horn, 1895, p. 101.



Fig. 219. Distribution. *Scymnus* (*P.*) *creperus* (peripheral localities dotted).

Scymnus (*Pullus*) *medionotans* Casey, 1899, p. 143.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 162.—J. Chapin, 1974, p. 29.

Scymnus (*Pullus*) *subtropicus* Casey, 1899, p. 143.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 162.—J. Chapin, 1974, p. 29.

Scymnus (*Pullus*) *hortensis* Wingo, 1952, p. 36.—J. Chapin, 1974, p. 29.

For detailed description, and discussion see Gordon, 1976b, p. 260.

Additional locality records: TEXAS: Garza Co., 2 mi. N. Justiceburg.
VIRGINIA: Virginia Beach.

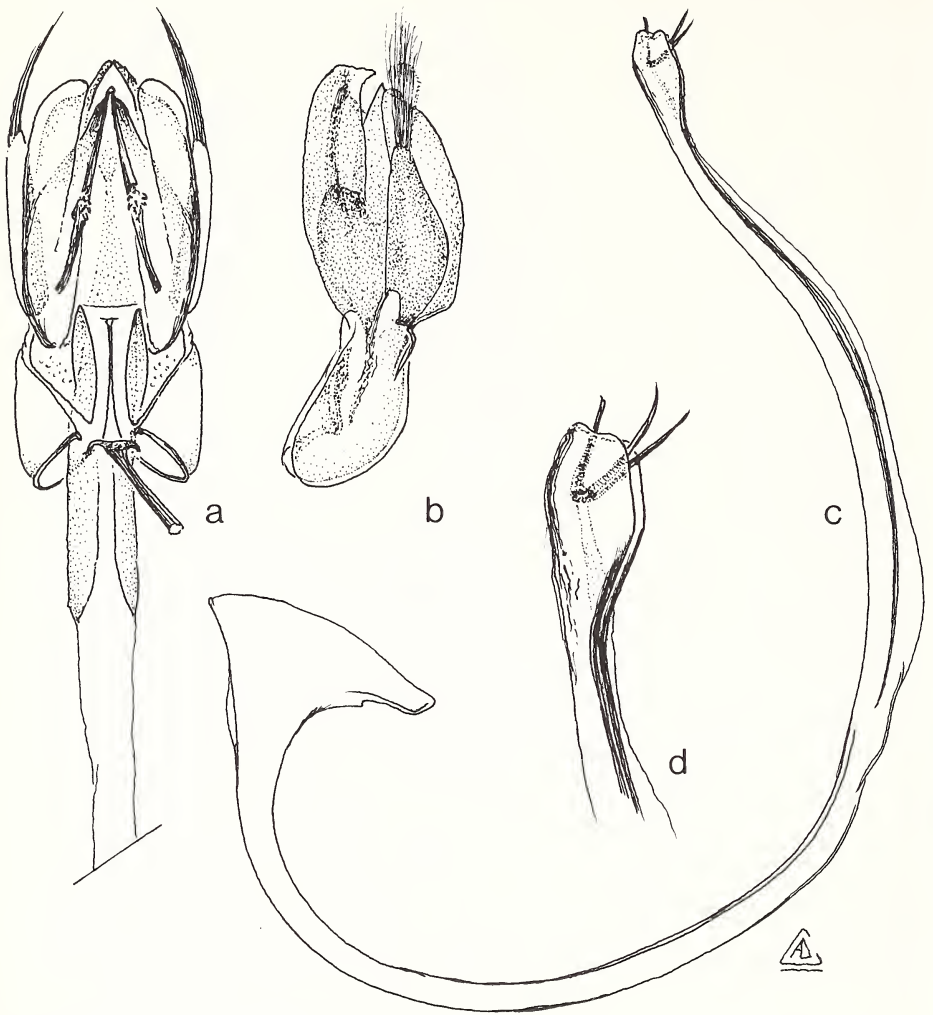


Fig. 220. *Scymnus (P.) bryanti*.

Scymnus (Pullus) bryanti Gordon

Fig. 220a-d; Map, Fig. 221

Scymnus (Pullus) bryanti Gordon, 1976b, p. 263.

For detailed description, and discussion see Gordon, 1976b, p. 263.

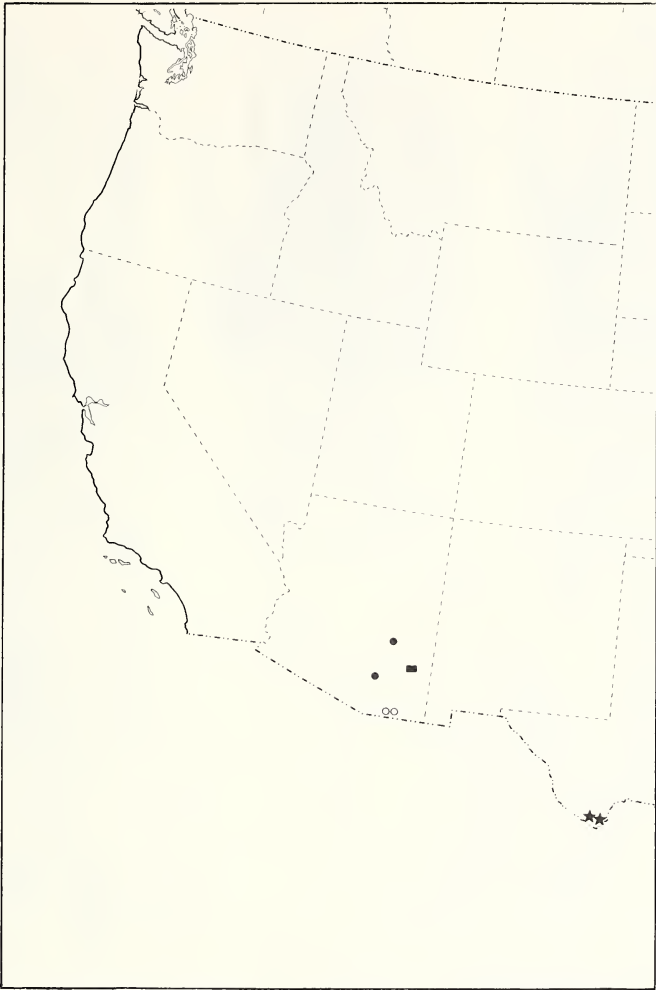


Fig. 221. Distribution. *Scymnus* (P.) *bryanti* (dot); *S. (P.) howdeni* (star); *S. (P.) hubbardi* (rectangle); *S. (P.) huachuca* (open circle).

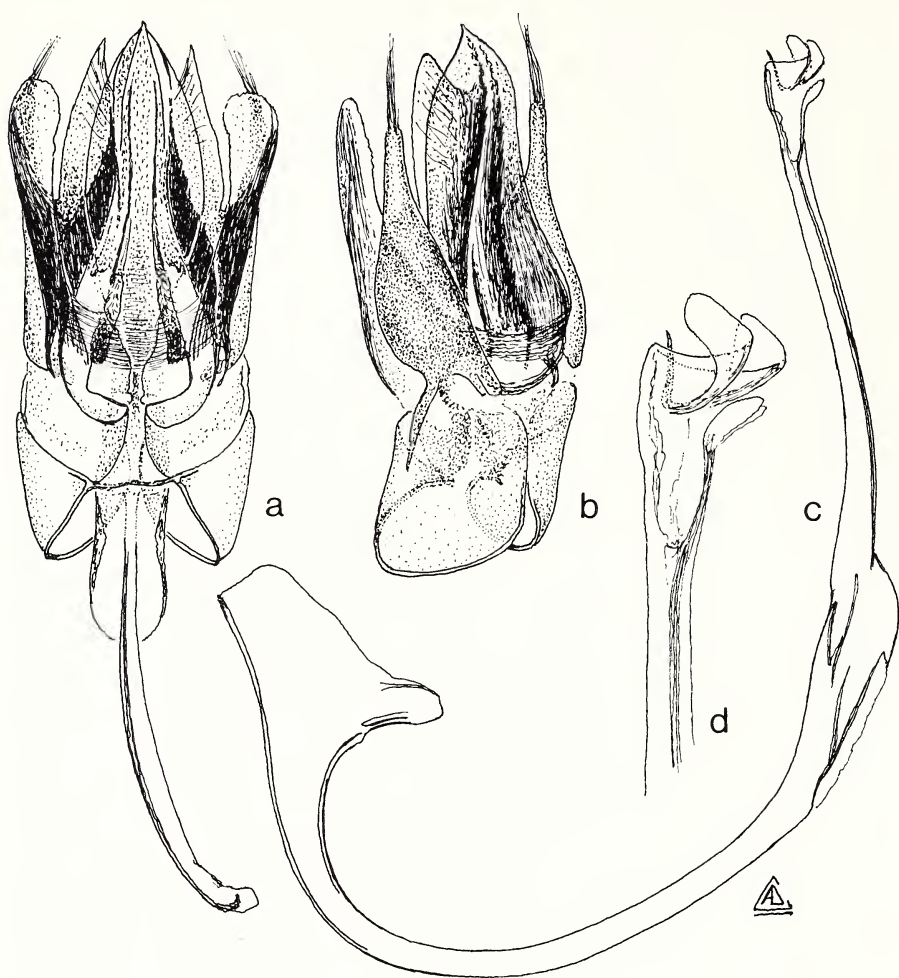


Fig. 222. *Scymnus (P.) howdeni*.

Scymnus (Pullus) howdeni Gordon
Fig. 222a-d; Map, Fig. 221

Scymnus (Pullus) howdeni Gordon, 1976b, p. 265.

For detailed description, and discussion see Gordon, 1976b, p. 265.

Scymnus (Pullus) hubbardi Gordon
Fig. 223a-d; Map, Fig. 221

Scymnus (Pullus) hubbardi Gordon, 1976b, p. 268.

For detailed description, and discussion see Gordon, 1976b, p. 268.

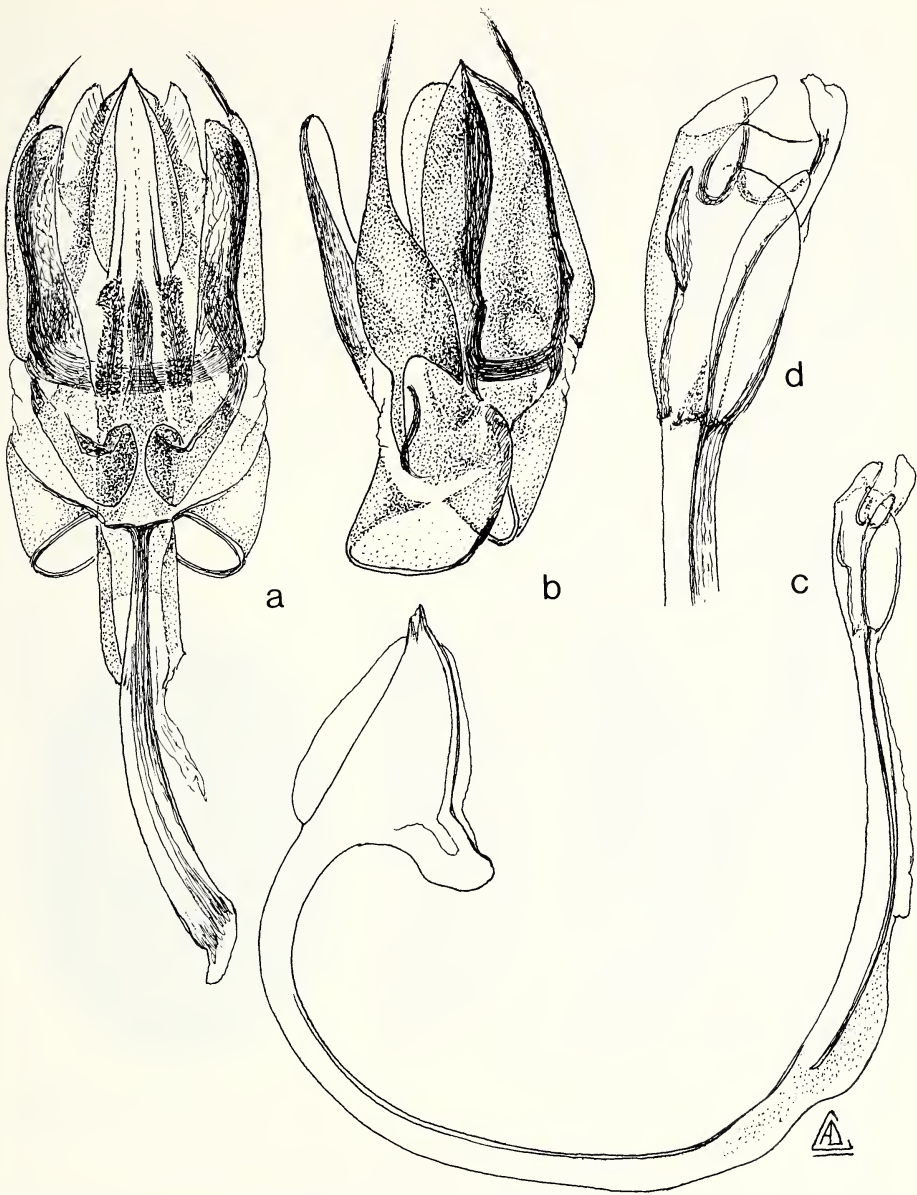


Fig. 223. *Scymnus (P.) hubbardi*.

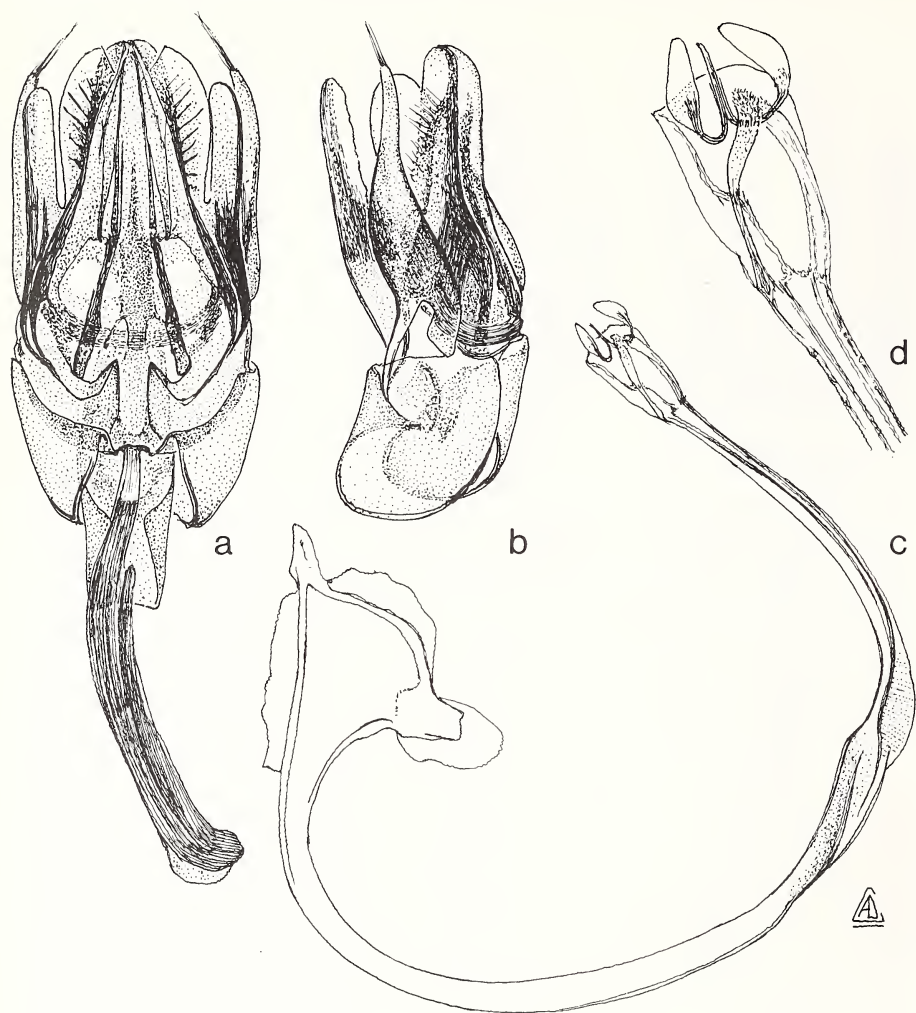


Fig. 224. *Scymnus (P.) huachuca*.

Scymnus (Pullus) huachuca Gordon

Fig. 224a-d; Map, Fig. 221

Scymnus (Pullus) huachuca Gordon, 1976b, p. 269.

For detailed description, and discussion see Gordon, 1976b, p. 269.

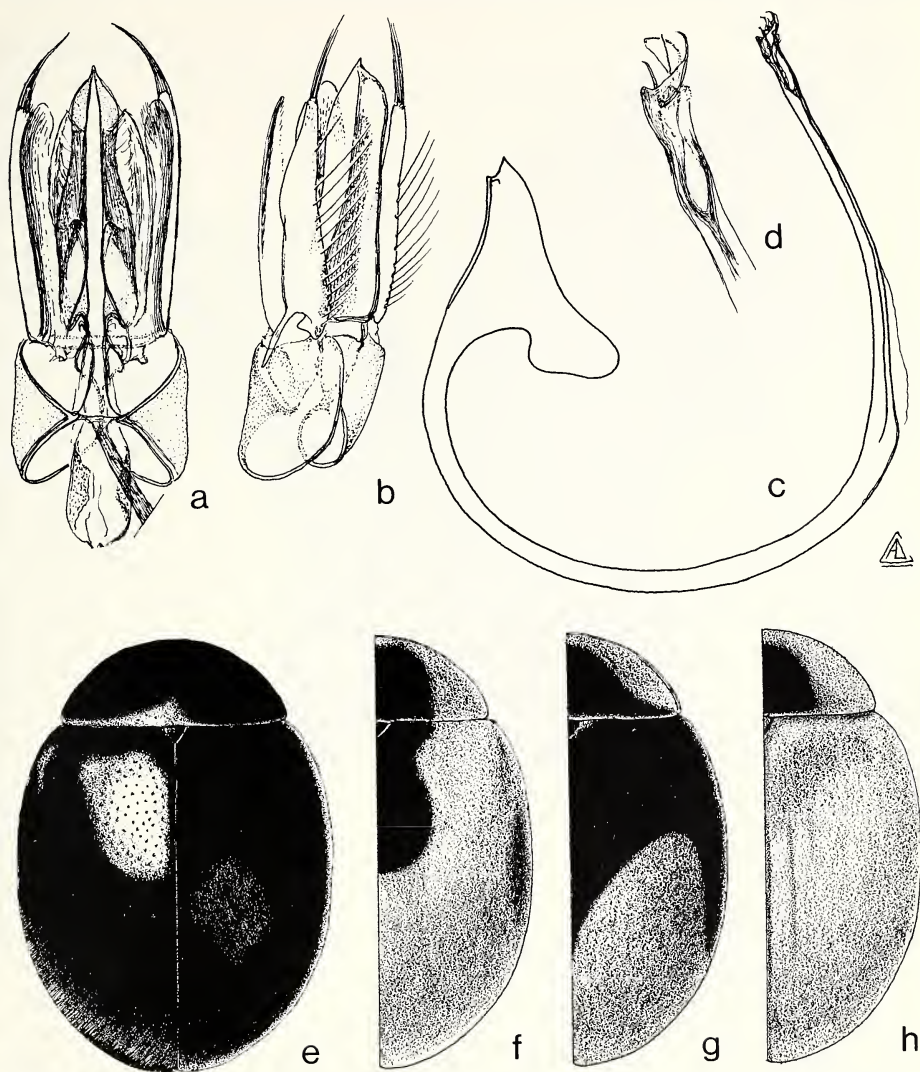


Fig. 225. *Scymnus (P.) brullei*.

Scymnus (Pullus) brullei Mulsant

Fig. 225a-h; Map, Fig. 226

Scymnus (Pullus) brullei Mulsant, 1850, p. 984.—Casey, 1899, p. 160.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 155.—Wingo, 1952, p. 33.—J. Chapin, 1974, p. 26.—Gordon, 1976b, p. 270.

Scymnus brullei: Crotch, 1874b, p. 264.—Horn, 1895, p. 101.

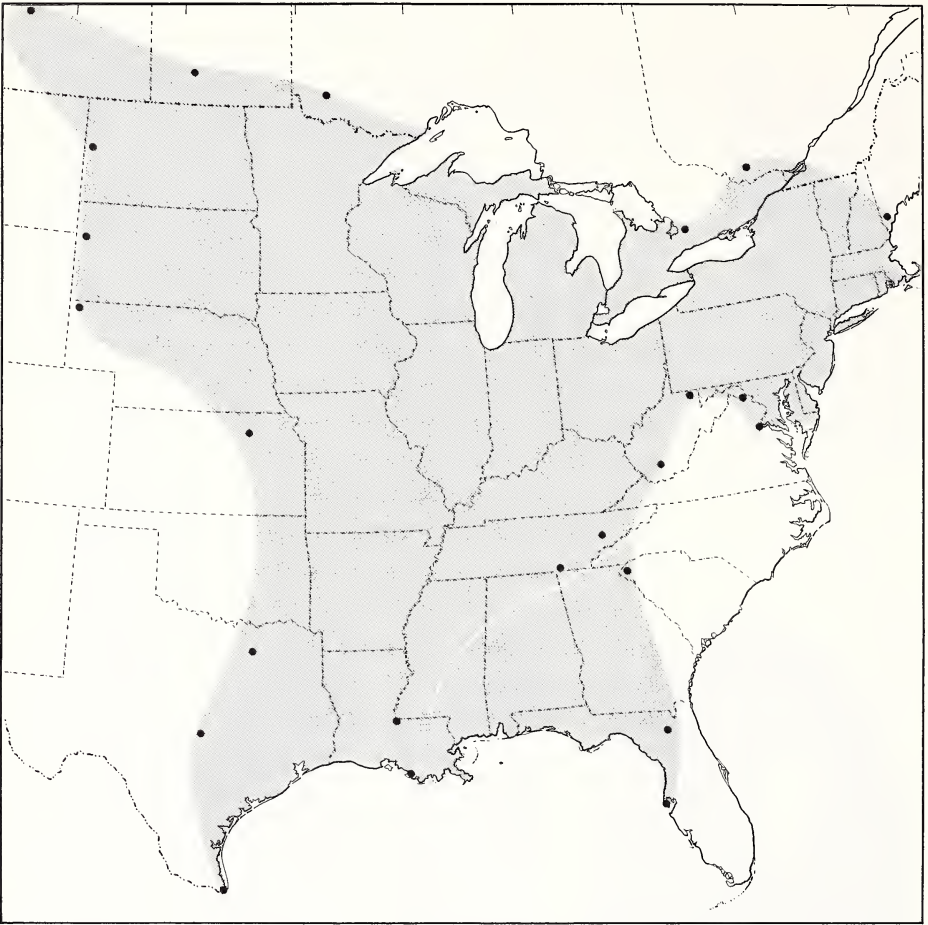


Fig. 226. Distribution. *Scymnus (P.) brullei*.

Scymnus (Pullus) hemorrhous var. *divisus* Casey, 1899, p. 140.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 159.—Wingo, 1952, p. 33.

Scymnus (Pullus) hemorrhous var. *laurenticus* Casey, 1899, p. 140.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 159.—Wingo, 1952, p. 33.

Scymnus (Pullus) hemorrhous var. *subaeneus* Casey, 1899, p. 141.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 159.—Wingo, 1952, p. 33.

Scymnus (Pullus) lodi Stehr, 1946, p. 80.—Wingo, 1952, p. 30.—Gordon, 1970b, p. 270.

For detailed synonymy, description, and discussion see Gordon, 1976b, p. 270.

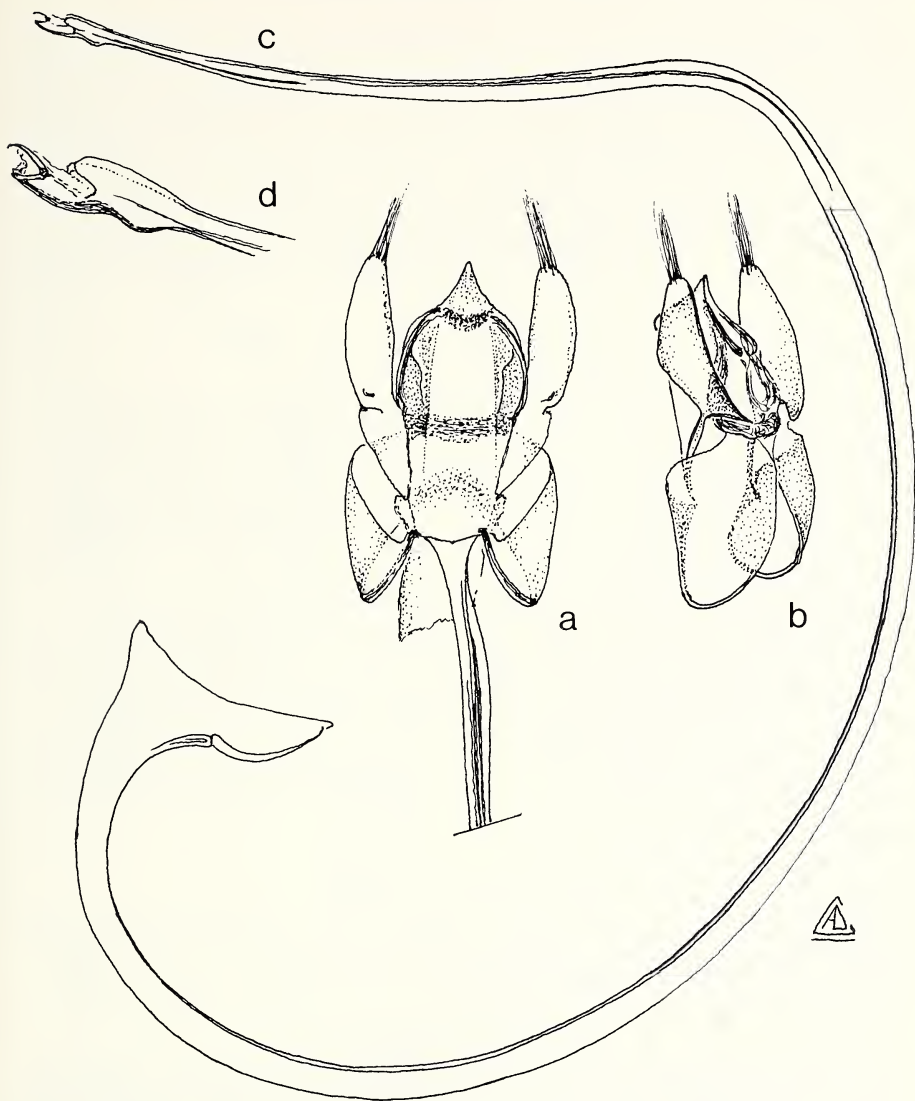


Fig. 227. *Scymnus (P.) securus*.

Scymnus (Pullus) securus J. Chapin

Fig. 227a-b; Map, Fig. 228

Scymnus (Pullus) securus J. Chapin, 1973, p. 1072.—J. Chapin, 1974, p. 25.—Gordon, 1976b, p. 275.

For detailed description, and discussion see Gordon, 1976b, p. 275.

Additional locality record: ONTARIO: Kent Co., Tilbury.

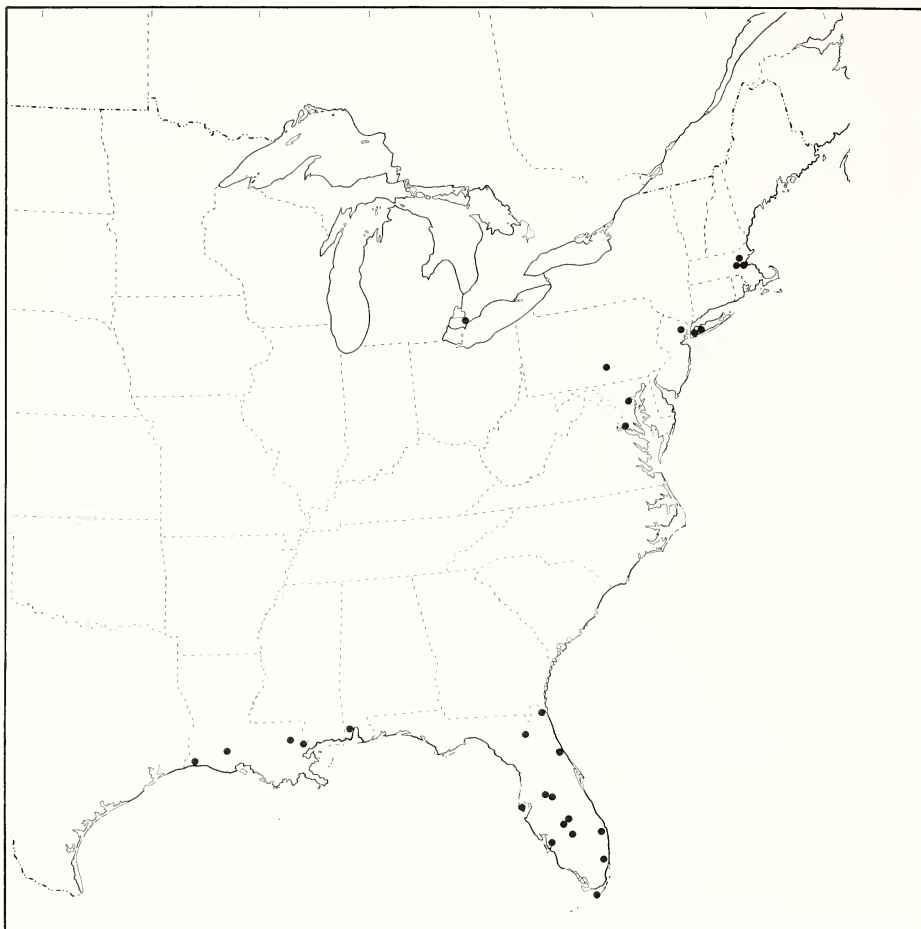


Fig. 228. Distribution. *Scymnus (P.) securus*.

Genus *Nephus* Mulsant

Scymnus (Nephus) Mulsant, 1846, p. 237.—Mulsant, 1850, p. 958.—Casey, 1899, p. 167.—Korschefsky, 1931, p. 116.—Mader, 1950, p. 60.—Wingo, 1952, p. 19.—Bielewski, 1959, p. 49.—Arnett, 1963, p. 812.—J. Chapin, 1974, p. 33. Type-species; *Sphaeridium quadrimaculatum* Herbst, by subsequent designation of Korschefsky, 1931.

Nephus: Pope, 1957, p. 309.—Chapin, 1965, p. 200.—Gordon, 1976b, p. 276.—Belicek, 1976, p. 306.

Scymnini with antenna 10 or 11-segmented, basal 2 segments fused or not (Figs. 229a–f). Prosternum lacking intercoxal carinae except short carina often present

adjacent to coxal cavity, not extending anterior to cavity (Fig. 229g). Abdomen with 6 visible sterna; postcoxal line on first sternum incomplete, nearly reaching lateral margin, apical end either parallel to hind margin of sternum or recurved toward basal margin (Fig. 229h–j). Tarsus 3-segmented. Female genitalia lacking infundibulum, genital plate long, narrow, triangular (Fig. 229k); male genitalia simple, basal lobe asymmetrical or symmetrical.

The genus *Nephus* was revised in detail by Gordon (1976b), therefore, only additional locality records and some necessary corrections in synonymy are included for each species, and one additional species is described.

KEY TO SUBGENERA OF *Nephus*

1. Postcoxal line on first abdominal sternum parallel to hind margin of sternum, at most with only extreme apex curved forward (Fig. 229j); antenna 10-segmented, basal 2 segments tightly joined (Fig. 229d) 2
 - Postcoxal line not completely parallel to hind margin of sternum, definitely curved forward apically (Fig. 229 h, i) 3
- 2(1). Body dorsoventrally flattened (Fig. 255f); antenna short, club oval (Fig. 229f) *Depressoscymnus* Gordon
 - Body not dorsoventrally flattened; antenna of normal length, club with inner margin of segments discontinuous (Fig. 229d) *Scymnobius* Casey
- 3(1). Postcoxal line strongly curved forward along lateral border of first sternum, extending onto basal half of sternum *Sidis* Mulsant
 - Postcoxal line not extending onto basal half of sternum, gently curved forward apically 4
- 4(3). Antenna 11-segmented (Fig. 229b) *Nephus* Mulsant
 - Antenna 10-segmented (Fig. 229e) *Turbocymnus* Gordon

Subgenus *Nephus* Mulsant

Nephus Mulsant, 1846, p. 237.—Mulsant, 1850, p. 958.—Casey, 1899, p. 167.—Wingo, 1952, p. 19.—Bielawski, 1959, p. 49.—Arnett, 1963, p. 812.—Gordon, 1976b, p. 278.—Belicek, 1976, p. 306. Type-species; *Sphaeridium quadrimaculatum* Herbst, by subsequent designation of Korschefsky, 1931.

Antenna 11-segmented, basal 2 segments fused or at least tightly joined (Fig. 229b). Abdomen with postcoxal line incomplete, distinctly curved forward apically, not parallel to hind margin of first sternum (Fig. 229h).

KEY TO SUBSPECIES OF *Nephus* (*Nephus*) *ornatus* (LeConte)

1. Elytron with irregular, elongate, yellow spot (Fig. 232); north of New England, west and north of the Great Lakes *ornatus naviculatus* (Casey)
- Elytron with 2 large, yellow spots (Fig. 230f); New England west to Great Lakes *ornatus ornatus* (LeConte)

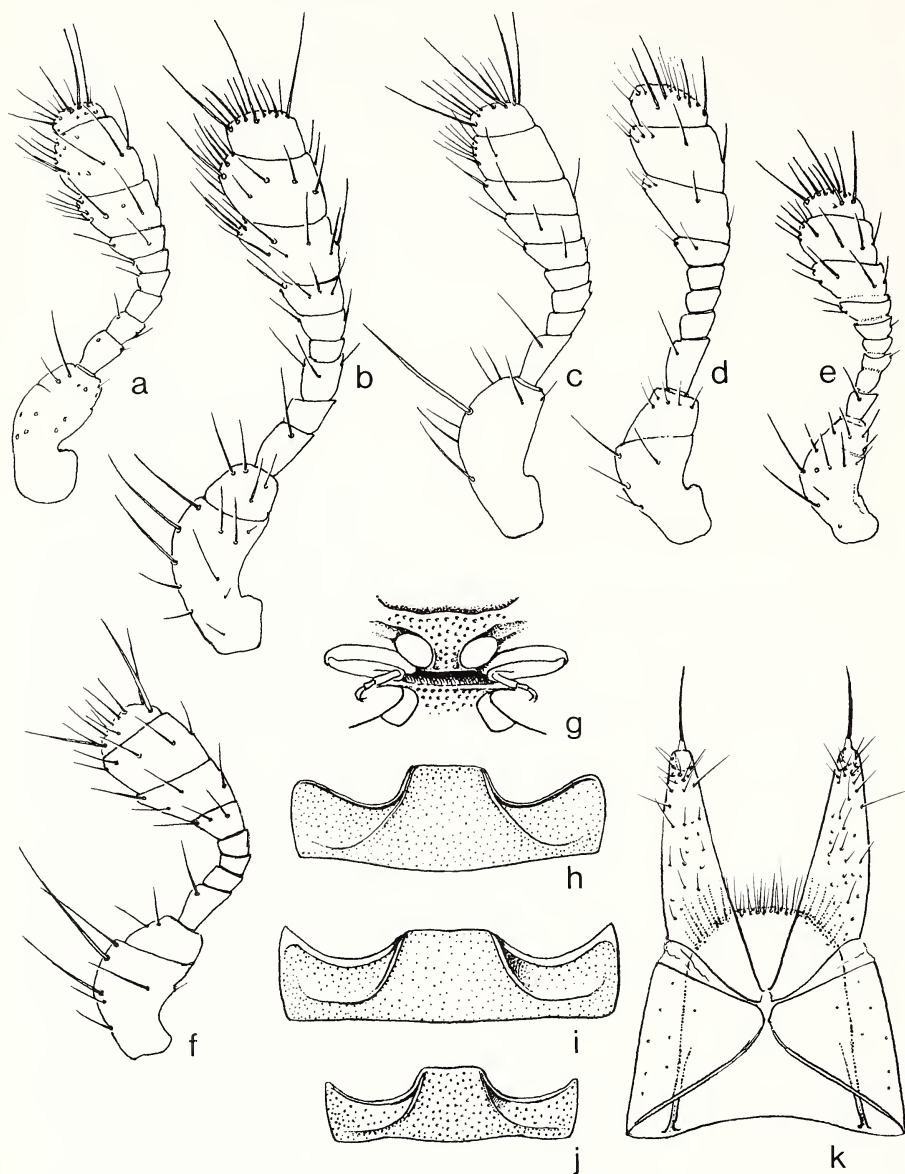


Fig. 229. a-f. Antennae. a. *Nephus (Nephus) quadrimaculatus*. b. *Nephus (Nephus) ornatus ornatus*. c. *Nephus (Sidis) binaevatus*. d. *Nephus (Scymnobioides) sordidus*. e. *Nephus (Turboscymnus) georgei*. f. *Nephus (Depressoscymnus) schwarzi*. g. Prothorax of *Nephus* sp. h. Postcoxal line of *Nephus (N.) ornatus ornatus*. i. Postcoxal line of *Nephus (Turboscymnus) georgei*. j. Postcoxal line of *Nephus (Scymnobioides) sp.*.

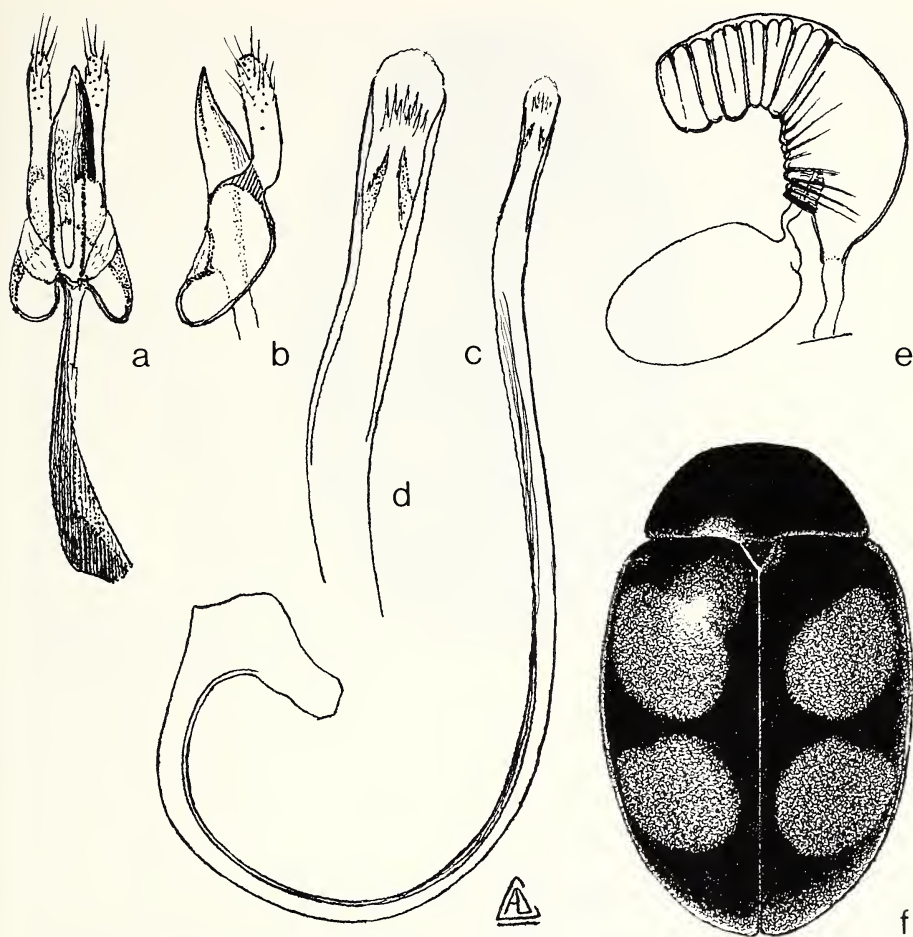


Fig. 230. *Nephus (N.) ornatus ornatus*.

Nephus (Nephus) ornatus ornatus (LeConte)

Fig. 230a–f; Map, Fig. 231

Scymnus ornatus LeConte, 1850, p. 239.—LeConte, 1852, p. 135.—Crotch, 1874b, p. 260.—Horn, 1895, p. 94.

Scymnus (Scymnobioides) ornatus: Casey, 1899, p. 155.—Leng, 1920, p. 214.

Scymnus (Nephus) ornatus: Korschefsky, 1931, p. 164.

Scymnus (Scymnobioides) sanguinifer Casey, 1899, p. 155.—Leng, 1920, p. 214.

Scymnus (Nephus) sanguinifer: Korschefsky, 1931, p. 165.—Gordon, 1976b, p. p. 280.

Scymnus frosti Casey, 1924, p. 171.—Gordon, 1976b, p. 280.

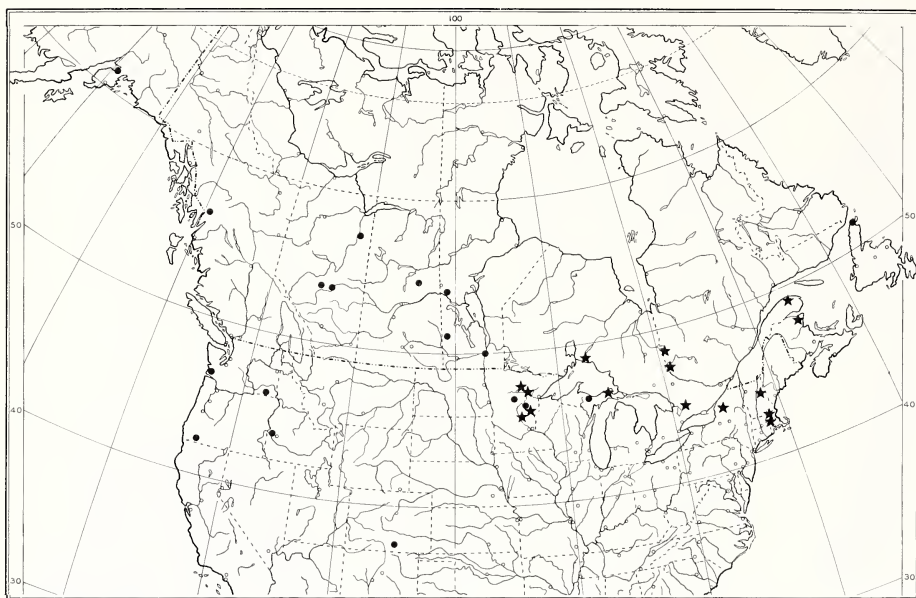


Fig. 231. Distribution. *Nephus (N.) ornatus ornatus* (star); *N. (N.) ornatus naviculatus* (dot).

Nephus ornatus: Belicek, 1976, p. 307.

Nephus (Nephus) ornatus ornatus: Gordon, 1976b, p. 280.

For detailed description, and discussion see Gordon, 1976b, p. 280.

Nephus (Nephus) ornatus naviculatus (Casey)

Fig. 232; Map, fig. 231

Scymnus (Scymnobioides) naviculatus Casey, 1899, p. 155.—Leng, 1920, p. 214.

Scymnus (Nephus) naviculatus: Korschefsky, 1931, p. 163.

Scymnus (Scymnus) kincaidii Hatch, 1961, p. 152.—Gordon, 1976b, p. 282.

Nephus (Nephus) ornatus naviculatus: Gordon, 1976b, p. 282.

For detailed description, and discussion see Gordon, 1976b, p. 282.

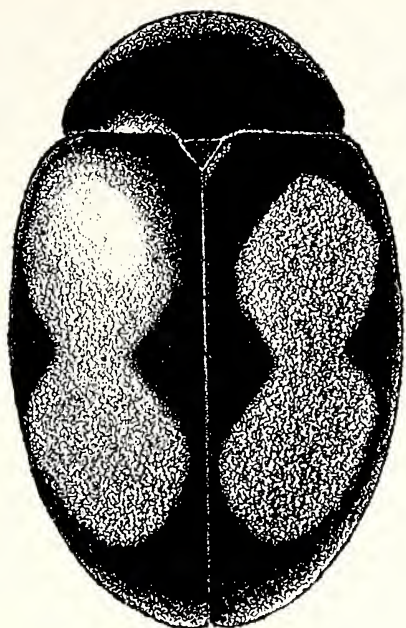


Fig. 232. *Nephus* (*N.*) *naviculatus*.

Subgenus *Sidis* Mulsant

Scymnus (*Sidis*) Mulsant, 1850, p. 975.—Korschevsky, 1931, p. 117.—Bielawski, 1959, p. 42.—Fursch, 1960, p. 305.—Gordon, 1976b, p. 282. Type-species: *Scymnus* (*Sidis*) *binaevatus* Mulsant, by subsequent designation of Korschevsky, 1931. *Nephus* (*Sidis*): Gordon, 1976b, p. 282.

Antenna 10-segmented, large basal segment undivided (Fig. 229c); apical segment of maxillary palpus cylindrical, obliquely truncate apically. Postcoxal line on 1st abdominal sternum incomplete, nearly reaching lateral margin, curved forward parallel to lateral margin. Male genitalia with basal lobe asymmetrical (Fig. 233a); spermathecal capsule of female divided into spindle-shaped nodulus and annulated cornu, accessory gland opening at middle of nodus (Fig. 233e).

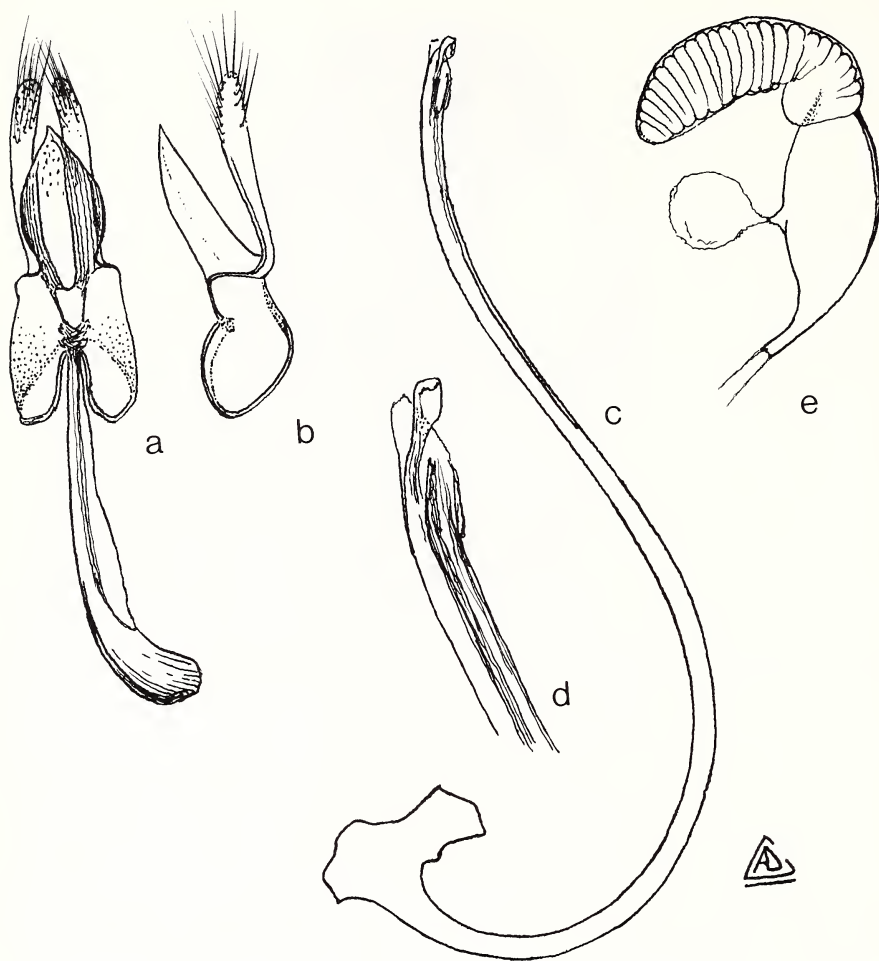


Fig. 233. *Nephus (Sidis) binaevatus*.

Nephus (Sidis) binaevatus (Mulsant)

Fig. 233a-e; Map, Fig. 234

Scymnus (Sidis) binaevatus Mulsant, 1850, p. 975.—Korschevsky, 1931, p. 150.—

Mader, 1950, p. 121.—Pope, 1957, p. 295.

Nephus (Sidis) binaevatus: Gordon, 1976b, p. 284.

For detailed description, and discussion see Gordon, 1976b, p. 284.

Additional locality records: CALIFORNIA: San Mateo Co., Daly City.



Fig. 234. Distribution. *Nephus (Sidis) binaevatus*.

Subgenus *Turboscymnus* Gordon

Turboscymnus Gordon, 1976b, p. 287. Type-species: *Scymnus georgei* Weise, by monotypy.

Antenna 10-segmented, one large basal segment present showing slight indication of fusion (Fig. 229e); apical segment of maxillary palpus cylindrical, obliquely truncate apically. Postcoxal line on 1st abdominal sternum curved throughout, apical end approaching lateral border of sternum, curved forward (Fig. 229i). Male genitalia with basal lobe asymmetrical; female spermathecal capsule feebly curved medially (Fig. 235e).

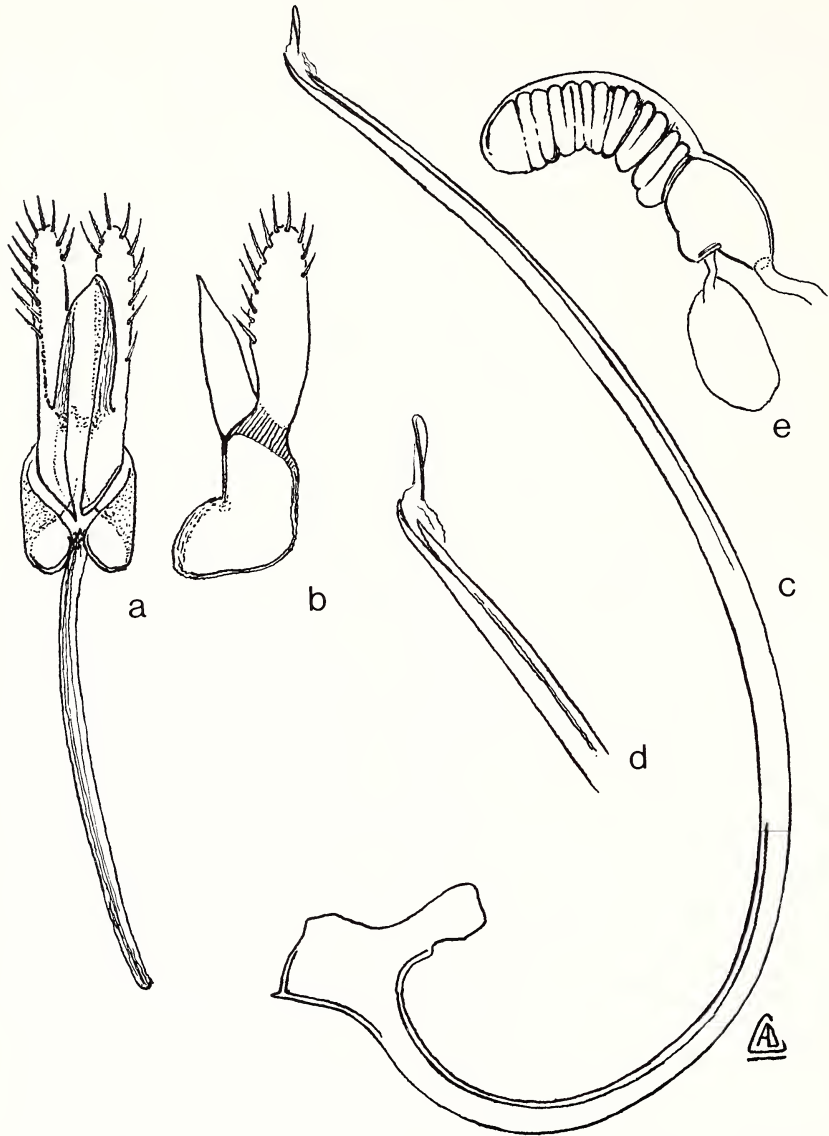


Fig. 235. *Nephus (Turboscymnus) georgei*.

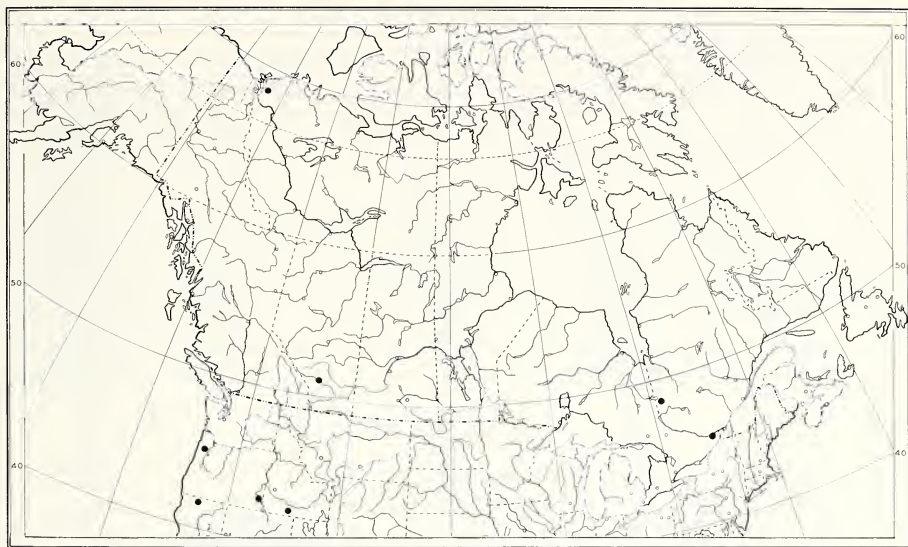


Fig. 236. Distribution. *Nephus (Turboscymnus) georgei*.

Nephus (Turboscymnus) georgei (Weise)

Fig. 235a-e; Map, Fig. 236

Scymnus bisignatus Horn, 1895, p. 92. — (not Boheman, 1859). — Weise, 1929, p. 33.

Scymnus (Scymnobius) bisignatus: Casey, 1899, p. 160. — Leng, 1920, p. 214.

Scymnus georgei Weise, 1929, p. 33. — Korschevsky, 1931, p. 159.

Scymnus (Scymnus) bisignatus: Hatch, 1961, p. 153.

Nephus georgei: Belicek, 1976, p. 307.

Nephus (Turboscymnus) georgei (Weise): Gordon, 1976b, p. 287.

For detailed description, and discussion see Gordon, 1976b, p. 287.

Subgenus *Scymnobi* Casey

Scymnus (*Scymnobi*) Casey, 1899, p. 139.—Weise, 1905, p. 220.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 116.—Hatch, 1961, p. 153.—Arnett, 1963, p. 812.—Gordon, 1976, p. 290.—Type-species; *Scymnus flavifrons* Melsheimer, by subsequent designation of Gordon, 1976b.

Nephus (*Scymnobi*): Gordon, 1976b, p. 290.

Antenna 10-segmented, basal 2 segments very tightly joined (Fig. 229d); apical segment of maxillary palpus cylindrical, obliquely truncate apically. Postcoxal line on 1st abdominal sternum running parallel to hind margin of sternum, not reaching lateral margin, apex may be slightly curved forward. Male genitalia with basal lobe symmetrical or asymmetrical; female spermathecal capsule bent or curved at approximately a right angle (Fig. 237e).

KEY TO SPECIES OF *Nephus* (*Scymnobi*)

1. Elytron entirely or mostly light yellow or brown 7
- Elytron entirely black or at least dark, often with yellow areas or spots 2
- 2(1). Elytron entirely black; pronotum reddish yellow *gordoni* (Dozier)
- Elytron not entirely black, or if so, then pronotum not entirely reddish yellow ... 3
- 3(2). Elytron completely black or with 2 yellow spots (Fig. 243f) or with one yellow spot (Fig. 243g) or with 2 spots feebly connected (Fig. 243h) California and Oregon ...
..... *atramentarius* (Boheman)
- Elytron not as described above, or if so, not occurring in California or Oregon ... 4
- 4(3). Elytron with 2 yellow spots; Arizona *quadrarius* (Casey)
- Elytron variable but never with 2 distinctly defined, yellow spots 5
- 5(4). Elytron with a more or less rounded, yellow or reddish yellow spot on apical half ... 6
- Elytron with 2 irregularly transverse yellow areas (Figs. 241e, f), areas often obscurely connected medially *guttulatus* (LeConte)
- 6(5). Form nearly round; pronotum entirely reddish yellow or with only a small, basal area darkened; Florida *bivulnerus* (Horn)
- Form elongate; pronotum usually entirely black or with antero-lateral angle narrowly pale; not restricted to Florida *flavifrons* (Melsheimer)
- 7(1). Elytron dark brown in basal 1/4, apical 1/4 paler brownish red (Fig. 252a)
..... *timberlakei*, n. sp.
- Elytron unicolorous or with only sutural margin darkened 8
- 8(7). Form short, rounded; pronotum distinctly paler than elytron *wickhami* Gordon
- Form elongate, narrow, pronotum and base of elytron unicolorous 9
- 9(3). Occurring in eastern United States from Atlantic Coast to eastern Texas
..... *intrusus* (Horn)
- Occurring in western United States from Pacific Coast to western Texas, Colorado and Idaho *sordidus* (Horn)

Nephus (*Scymnobi*) *flavifrons* (Melsheimer)

Fig. 237a–f; Map, Fig. 238

Scymnus flavifrons Melsheimer, 1847, p. 181.—LeConte, 1852, p. 136.—Crotch, 1874b, p. 261.—Horn, 1895, p. 93.—Blatchley, 1910, p. 526.

Scymnus (*Scymnobi*) *flavifrons*: Casey, 1899, p. 155.—Leng, 1920, p. 214.

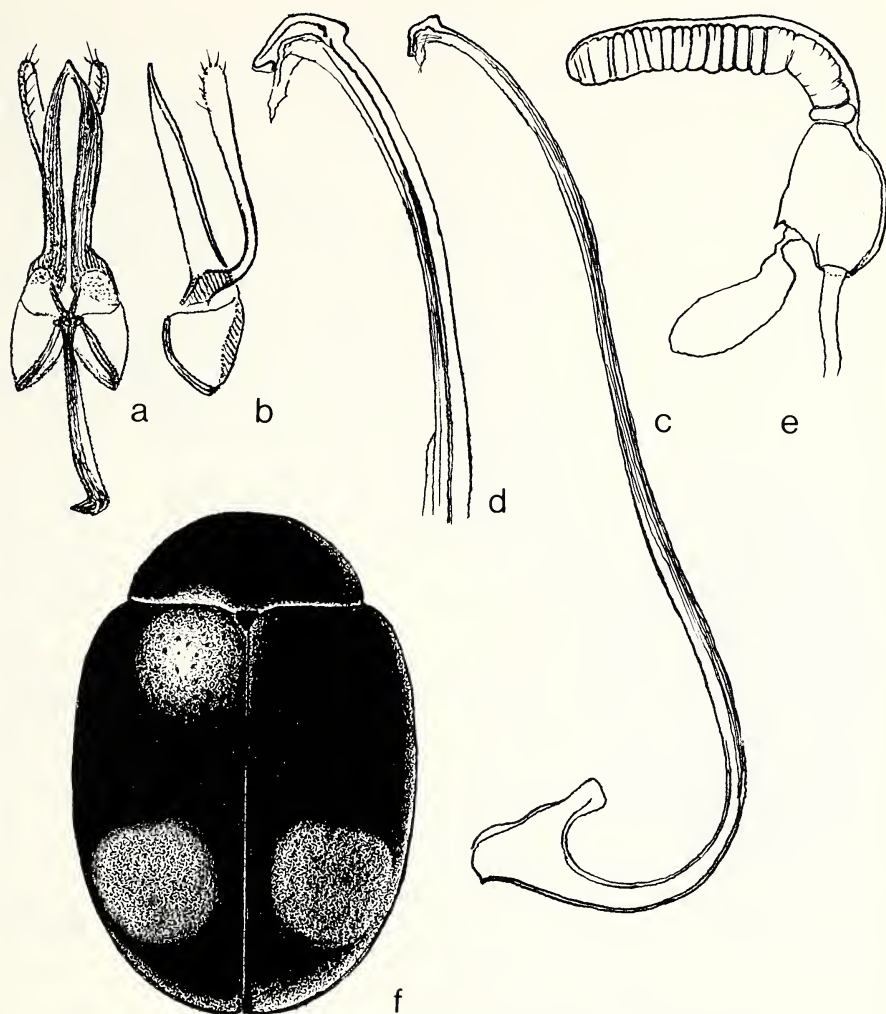


Fig. 237. *Nephus* (*S.*) *flavifrons*.

Scymnus (*Nephus*) *flavifrons*: Korschevsky, 1931, p. 158.—Wingo, 1952, p. 43.—J. Chapin, 1974, p.34.

Scymnus (*Nephus*) *bioculatus* Mulsant, 1850, p. 960.

Scymnus bioculatus: LeConte, 1852, p. 136.—Crotch, 1874b, p. 261.

Scymnus flavifrons var. *bioculatus*: Horn, 1895, p. 93.

Scymnus (*Scymnobius*) *bioculatus*: Casey, 1899, p. 155.

Scymnus (*Nephus*) *flavifrons* ab. *bioculatus*: Korschevsky, 1931, p. 158.

Scymnus (*Nephus*) *bioculatus guttiger* Mulsant, 1850, p. 961.

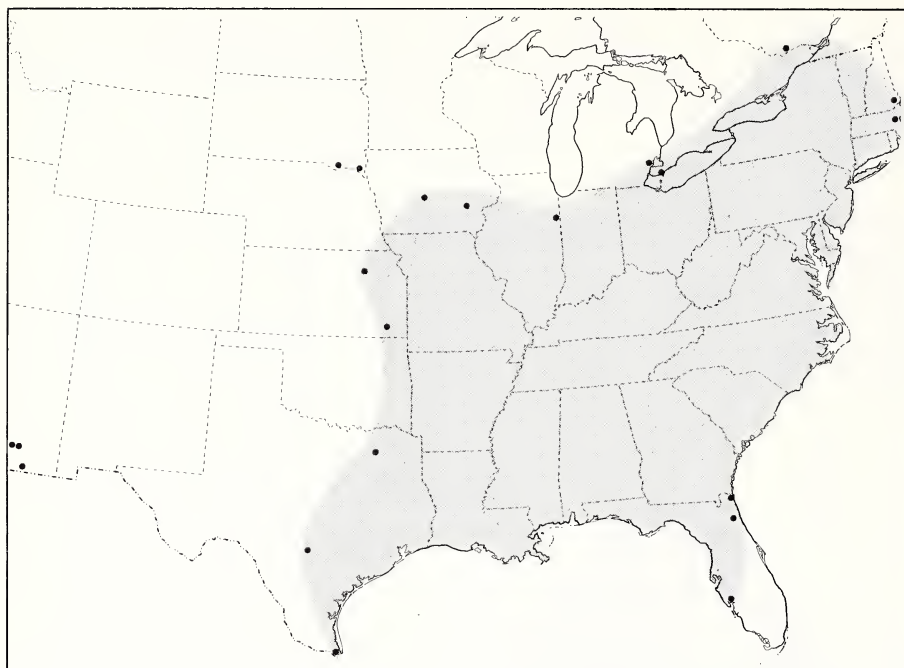


Fig. 238. Distribution. *Nephus* (*S.*) *flavifrons* (peripheral and disjunct localities dotted).

Scymnus bioculatus var. *guttiger*: Horn, 1895, p. 93.

Scymnus (*Nephus*) *flavifrons* ab. *guttiger*: Korschevsky, 1931, p. 158.

Scymnus (*Nephus*) *bioculatus marginellus* Mulsant, 1850, p. 961.

Scymnus bioculatus var. *marginellus*: Horn, 1895, p. 93.

Scymnus (*Nephus*) *flavifrons marginellus*: Korschevsky, 1931, p. 158.

Scymnus ludovicianus Casey, 1924, p. 172.—Leng and Mutchler, 1927, p. 33.—J.

Chapin, 1974, p. 34.—Gordon, 1976b, p. 292.

Nephus (*Scymnobius*) *flavifrons*: Gordon, 1976b, p. 292.

For detailed description, and discussion see Gordon, 1976b, p. 292.

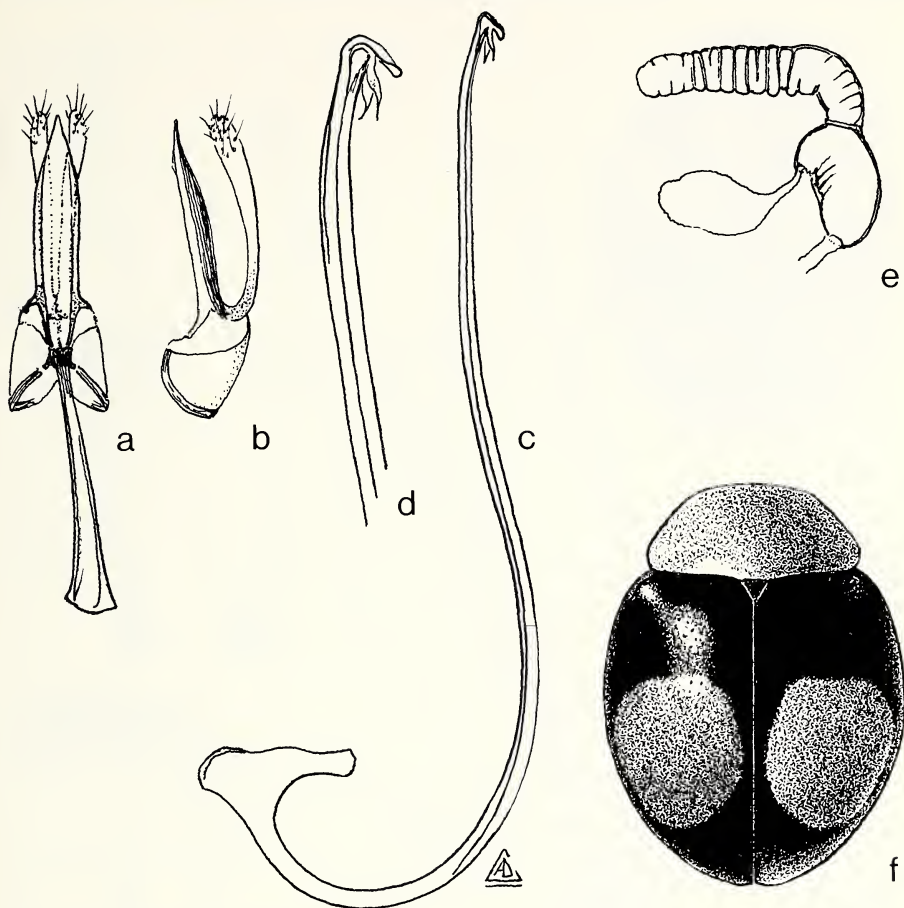


Fig. 239. *Nephus (S.) bivulnerus*.

Nephus (Scymnobioides) bivulnerus (Horn)

Fig. 239a-f; Map, Fig. 240

Scymnus bivulnerus Horn, 1895, p. 92.

Scymnus (Scymnobioides) bivulnerus: Casey, 1899, p. 155.—Leng, 1920, p. 214.

Scymnus (Nephus) bivulnerus: Karsch, 1931, p. 155.

Nephus (Scymnobioides) bivulnerus: Gordon, 1976b, p. 295.

For detailed description, and discussion see Gordon, 1976b, p. 295.

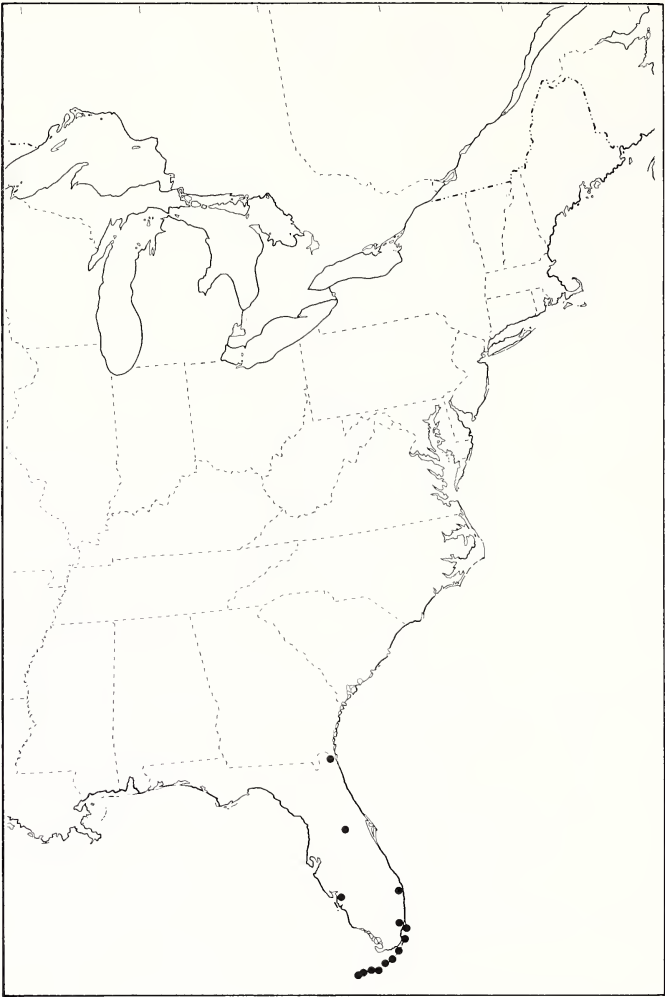


Fig. 240. Distribution. *Nephus (S.) bivulnerus*.

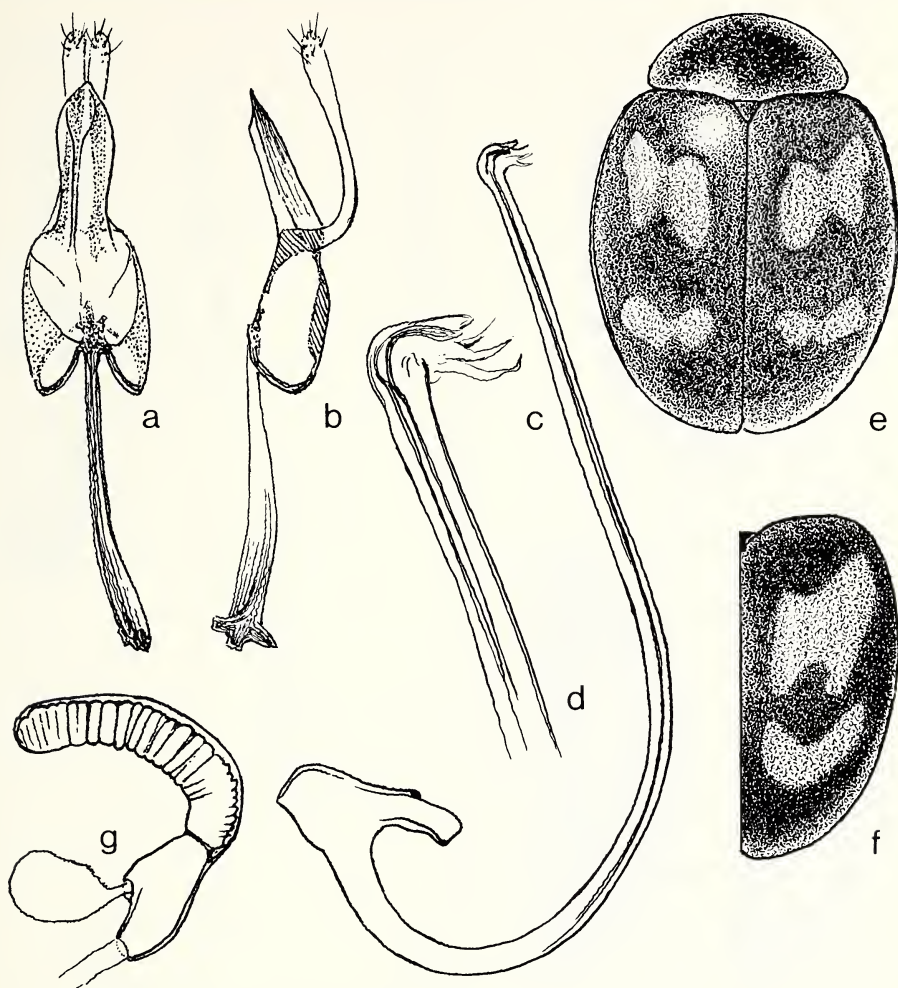


Fig. 241. *Nephus (S.) guttulatus*.

Nephus (Scymnobijs) guttulatus (LeConte)

Fig. 241a-g; Map, Fig. 242

Scymnus guttulatus LeConte, 1852, p. 136.—Crotch, 1874b, p. 261.—Horn, 1895, p. 95.

Scymnus (Scymnobijs) guttulatus: Casey, 1899, p. 155.—Leng, 1920, p. 214.

Scymnus (Nephus) guttulatus: Korschefsky, 1931, p. 159.

Scymnus coloradensis Horn, 1895, p. 94.—Leng, 1920, p. 214.—Gordon, 1976b, 298.

Scymnus (Scymnobijs) coloradensis: Casey, 1899, p. 156.

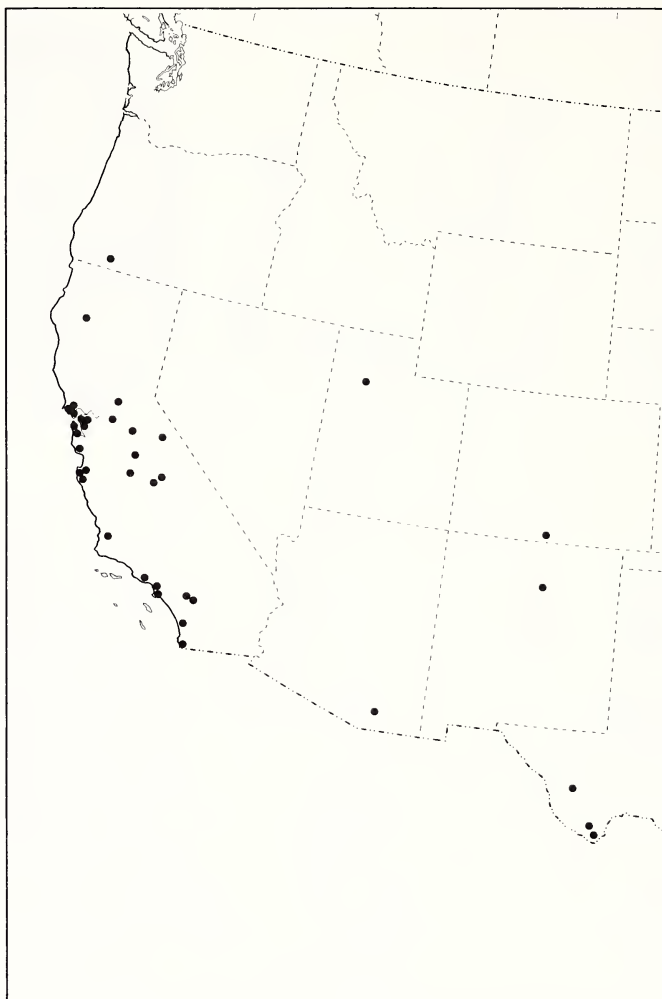


Fig. 242. Distribution. *Nephus (S.) guttulatus*.

Scymnus (Nephus) coloradensis: Korschefsky, 1931, p. 156.

Scymnus (Scymnobioides) scitus Casey, 1899, p. 156.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 165.—Gordon, 1976b, p. 298.

Scymnus (Scymnobioides) suavis Casey, 1899, p. 156.—Leng, 1920, p. 214.—Gordon, 1976b, p. 298.

Scymnus (Nephus) suavis: Korschefsky, 1931, p. 166.

Nephus (Scymnobioides) guttulatus: Gordon, 1976b, p. 298.

For detailed description, and discussion see Gordon, 1976b, p. 299.

Additional locality records: CALIFORNIA: San Diego Co., Mouth of Tijuana R.; San Luis Obispo Co., Oceano, Dune Lakes 3 mi. S.

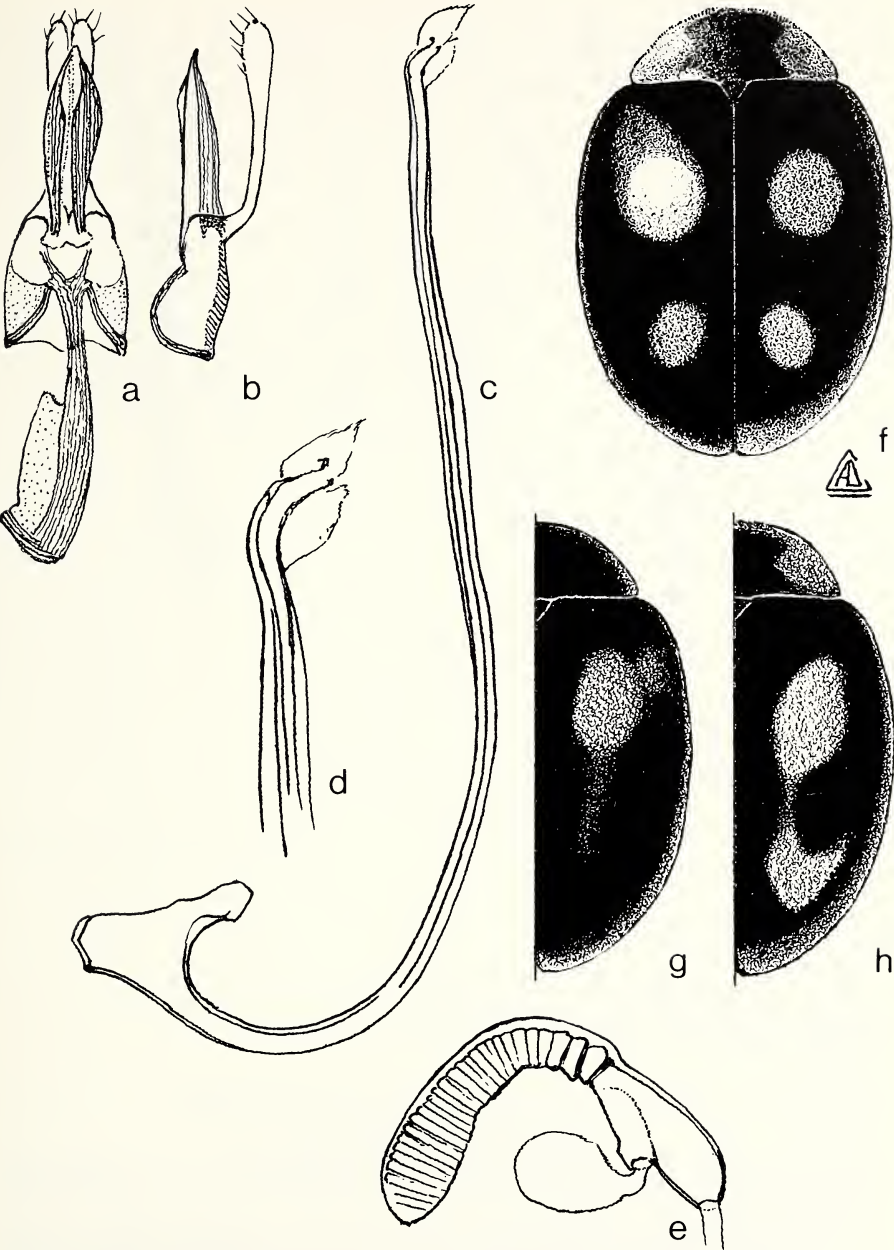


Fig. 243. *Nephus (S.) atramentarius*.

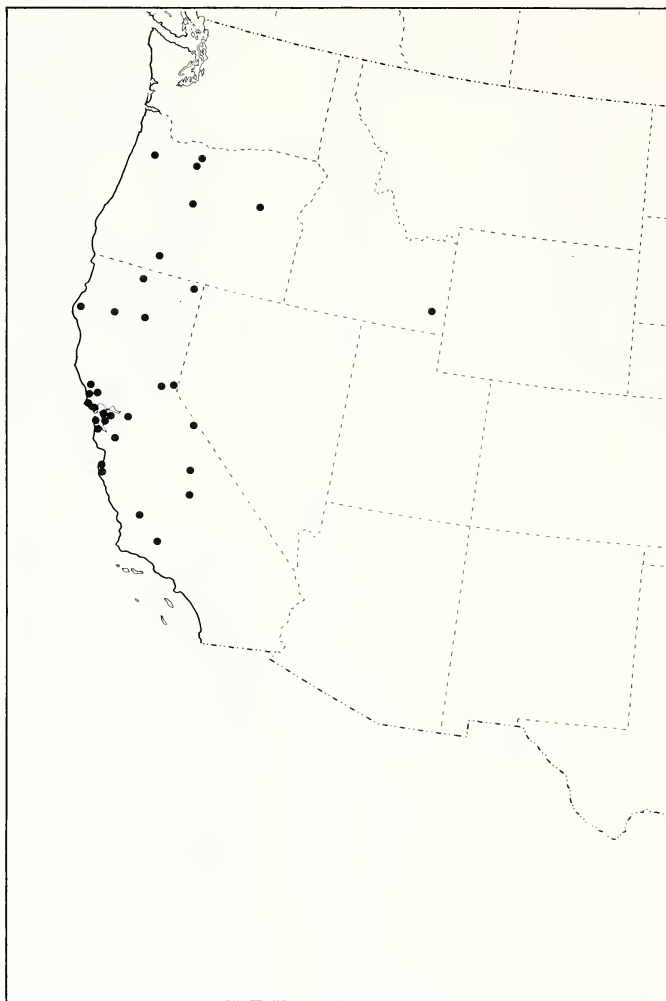


Fig. 244. Distribution. *Nephus* (S.) *atramentarius*.

Nephus (*Scymnobi*) *atramentarius* (Boheman)

Fig. 243a-h; Map, Fig. 244

Scymnus atramentarius Boheman, 1859, p. 207.—Leng, 1920, p. 214.—Korschevsky, 1931, p. 154.

Scymnus (*Scymnobi*) *maculatus* Hatch, 1961, p. 153.—Gordon, 1976b, p. 302.

Nephus (*Scymnobi*) *atramentarius*: Gordon, 1976b, p. 301.

For detailed description, and discussion see Gordon, 1976b, p. 301.

Additional locality record: IDAHO: Caribou Co., Soda Springs.

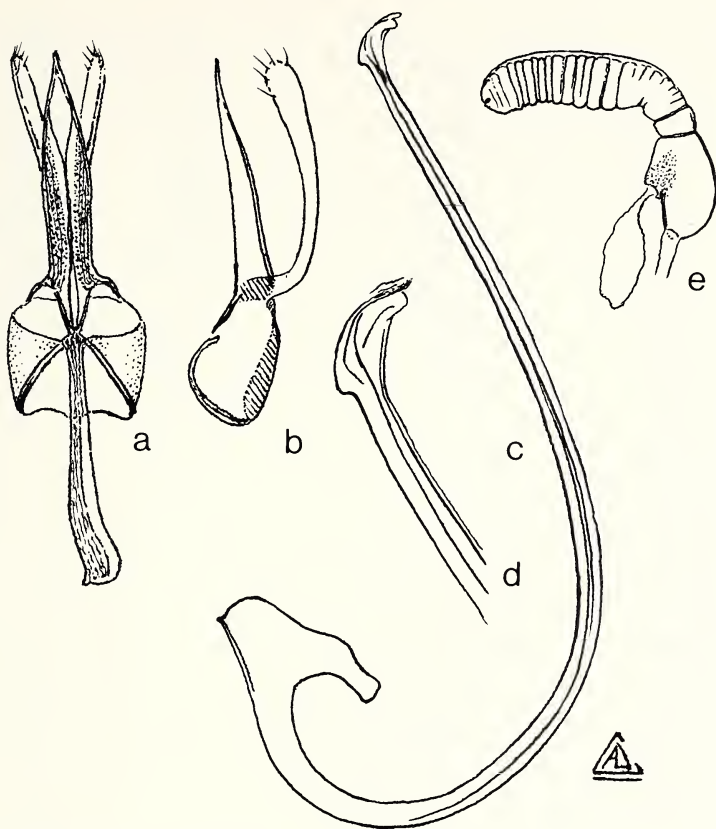


Fig. 245. *Nephus (S.) quadrarius*.

Nephus (Scymnobius) quadrarius (Casey)

Fig. 245a-e; Map, Fig. 246

Scymnus quadrarius Casey, 1924, p. 173.—Leng, and Mutchler, 1927, p. 33.

Scymnus schuberti Nunenmacher, 1934a, p. 17.—Gordon, 1976b, p. 303.

Nephus (Scymnobius) quadrarius: Gordon, 1976b, p. 303.

For detailed description, and discussion see Gordon, 1976b, p. 303.

Additonal locality record: ARIZONA: Santa Cruz Co., Madera Canyon.

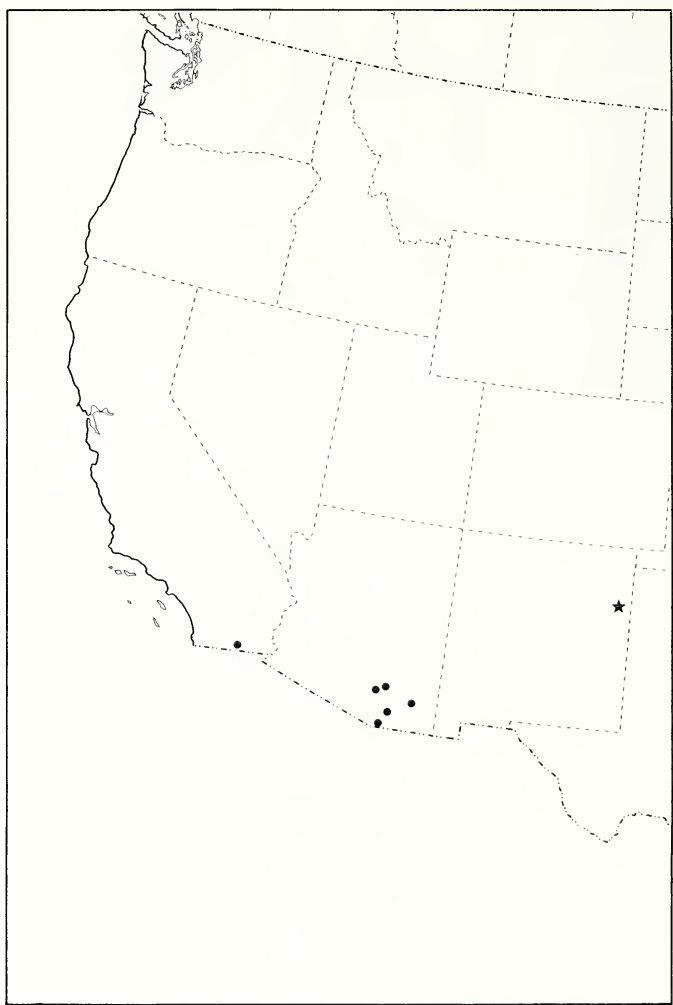


Fig. 246. Distribution. *Nephus (S.) quadrarius* (dot); *N. (S.) wickhami* (star).

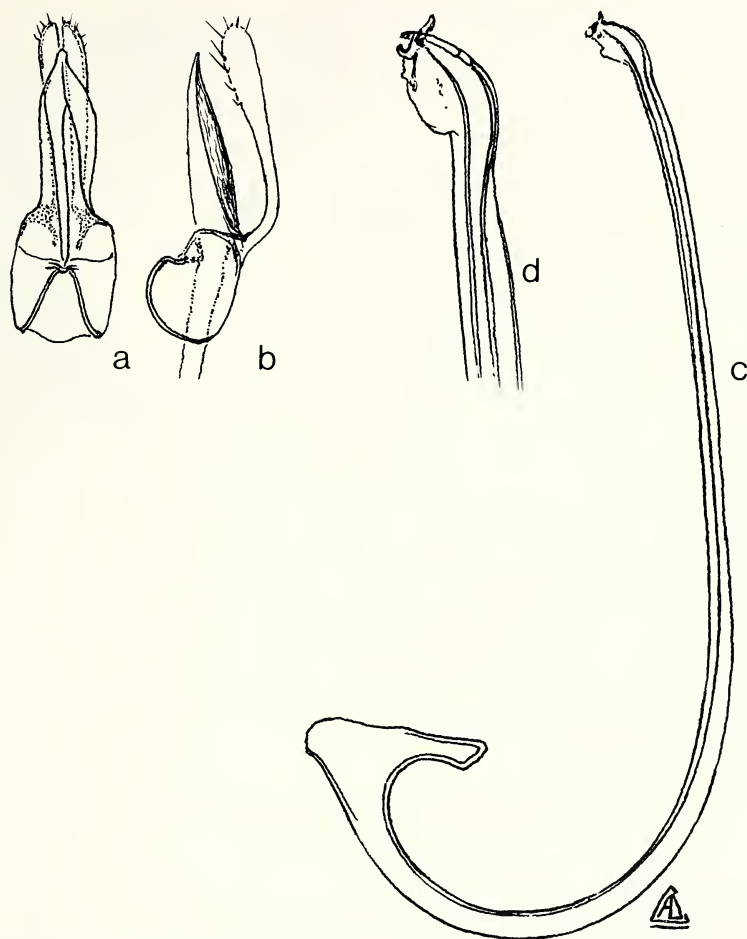


Fig. 247. *Nephus* (*S.*) *wickhami*.

Nephus (*Scymnobi*) *wickhami* Gordon

Fig. 247a-d; Map, Fig. 246

Nephus (*Scymnobi*) *wickhami* Gordon, 1976b, p. 306.

For detailed description, and discussion see Gordon, 1976b, p. 306.

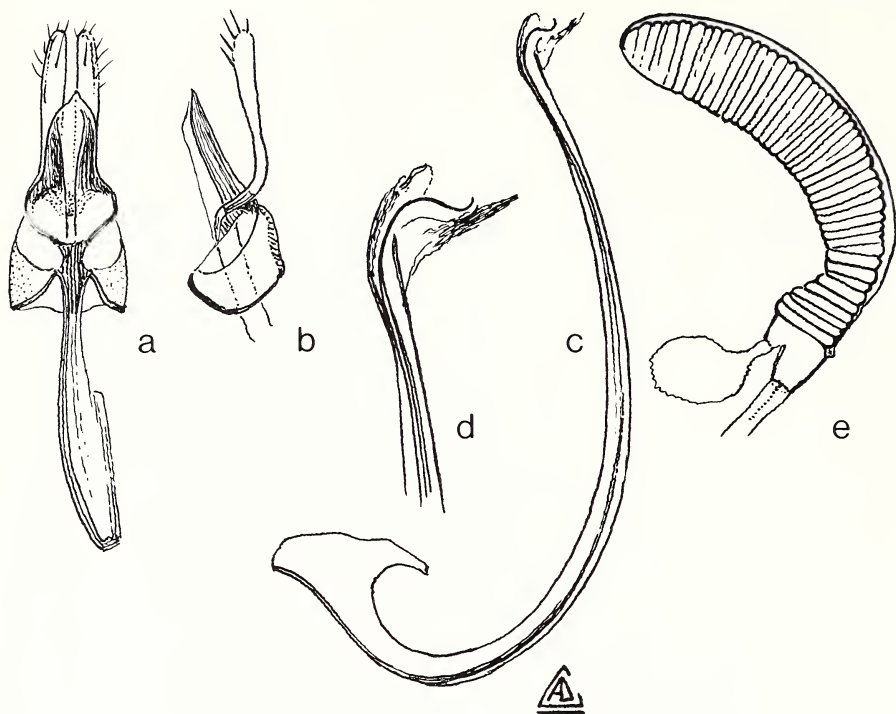


Fig. 248. *Nephus (S.) sordidus*.

Nephus (Scymnobioides) sordidus (Horn)

Fig. 248a-e; Map, Fig. 249

Scymnus sordidus Horn, 1895, p. 93.

Scymnus (Scymnobioides) sordidus: Casey, 1899, p. 156.—Leng, 1920, p. 214.

Scymnus (Nephus) sordidus: Korschefsky, 1931, p. 166.

Scymnus (Scymnobioides) intrusoides Hatch, 1961, p. 153.—Gordon, 1976b, p. 309.

Nephus sordidus: Belicek, 1976, p. 307.

Nephus (Scymnobioides) sordidus: Gordon, 1976b, p. 309.

For detailed description, and discussion see Gordon, 1976b, p. 309.

Additional locality records: CALIFORNIA: Imperial Co., Glamis; Riverside Co., Rice Dunes; San Diego, Co., mouth of Tijuana R.

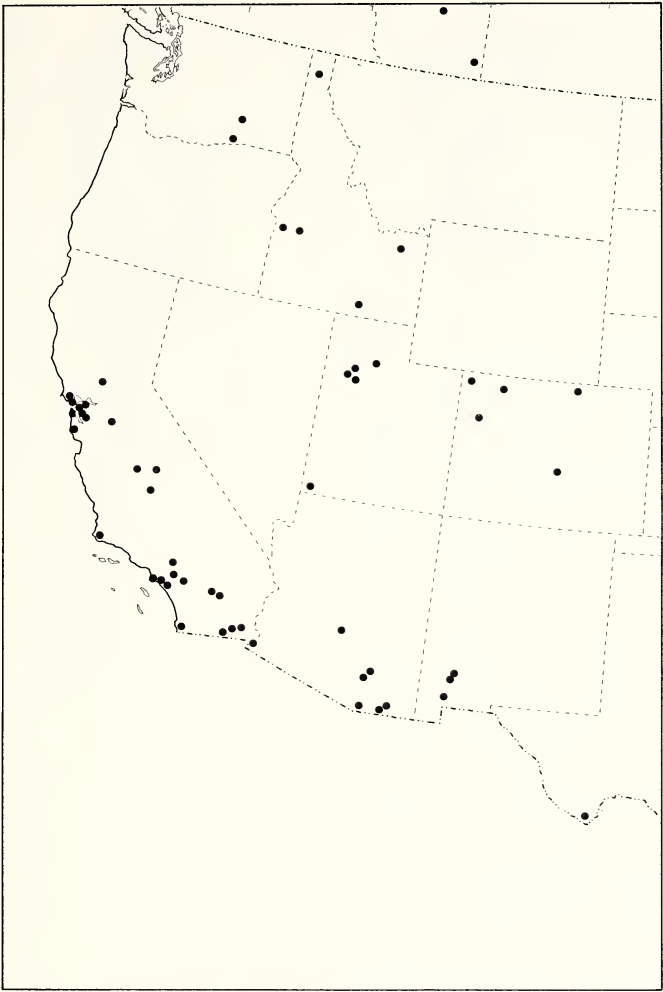


Fig. 249. Distribution. *Nephus (S.) sordidus*.

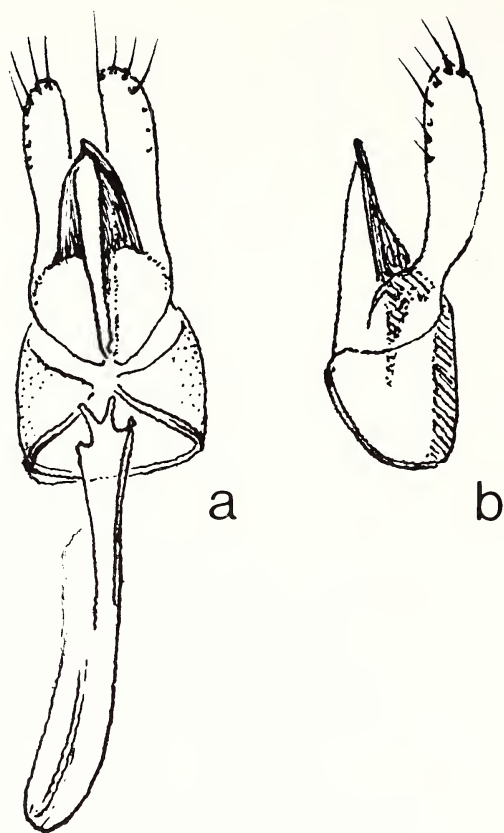


Fig. 250. *Nephus (S.) intrusus*.

Nephus (Scymnobius) intrusus (Horn)
Fig. 250a-b; Fig. 251c-e; Map, Fig. 253

Scymnus intrusus Horn, 1895, p. 92.—Blatchley, 1910, p. 526.

Scymnus (Scymnobius) intrusus: Casey, 1899, p. 156.—Leng, 1920, p. 214.

Scymnus (Nephus) intrusus: Korschevsky, 1931, p. 160.—Wingo, 1952, p. 43.—J. Chapin, 1974, p. 34.

Scymnus (Scymnobius) inops: Casey, 1899, p. 156.—Leng, 1920, p. 214.—Gordon, 1976b, p. 312.

Scymnus (Nephus) inops: Korschevsky, 1931, p. 160.

Nephus (Scymnobius) intrusus: Gordon, 1976b, p. 312.

For detailed description, and discussion see Gordon, 1976b, p. 312.

Additional locality records: TEXAS: Jones Co., 2 mi. w. Noodle; Tom Green Co., 16 mi. NE San Angelo.

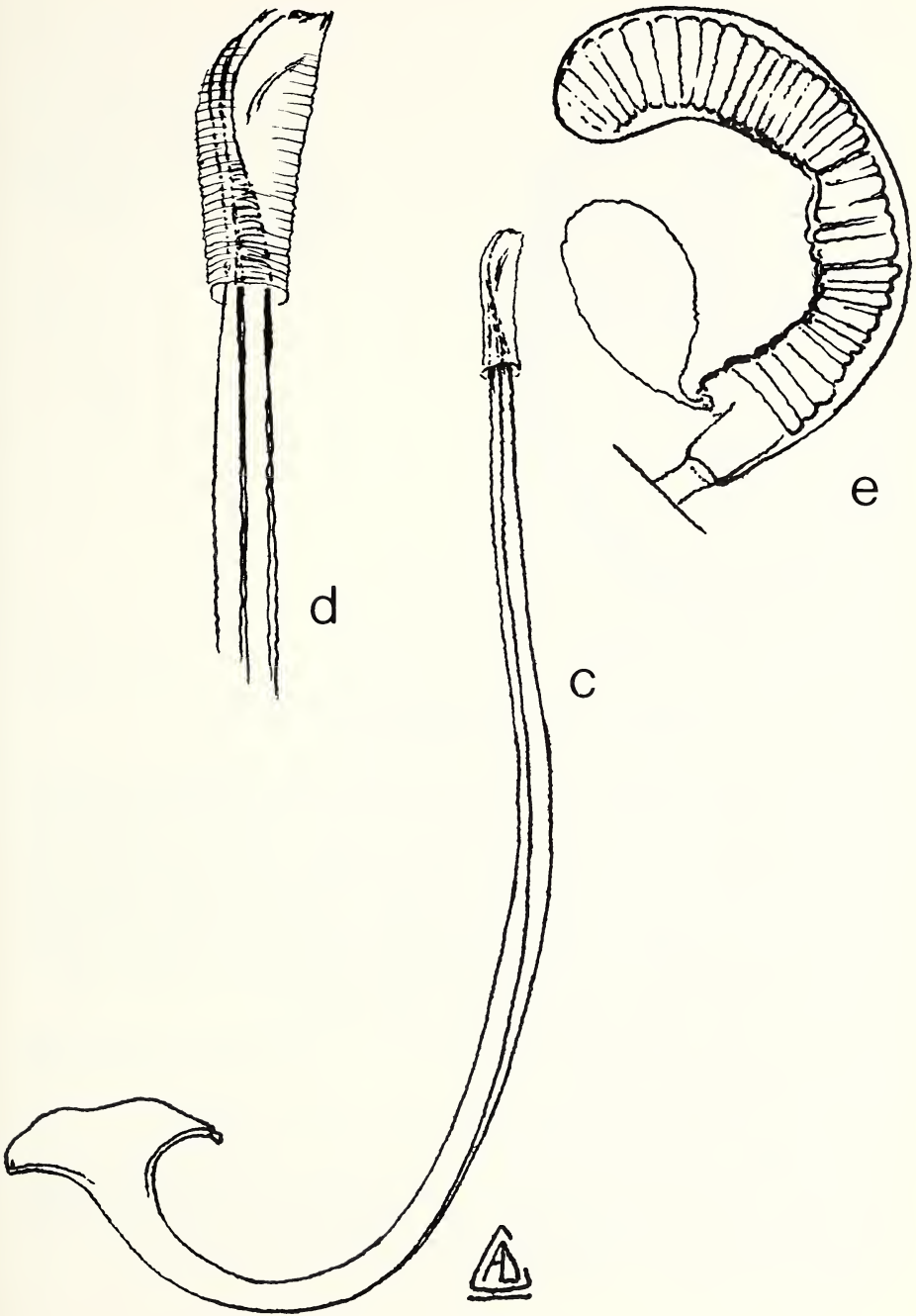


Fig. 251. *Nephus (S.) intrusus*.

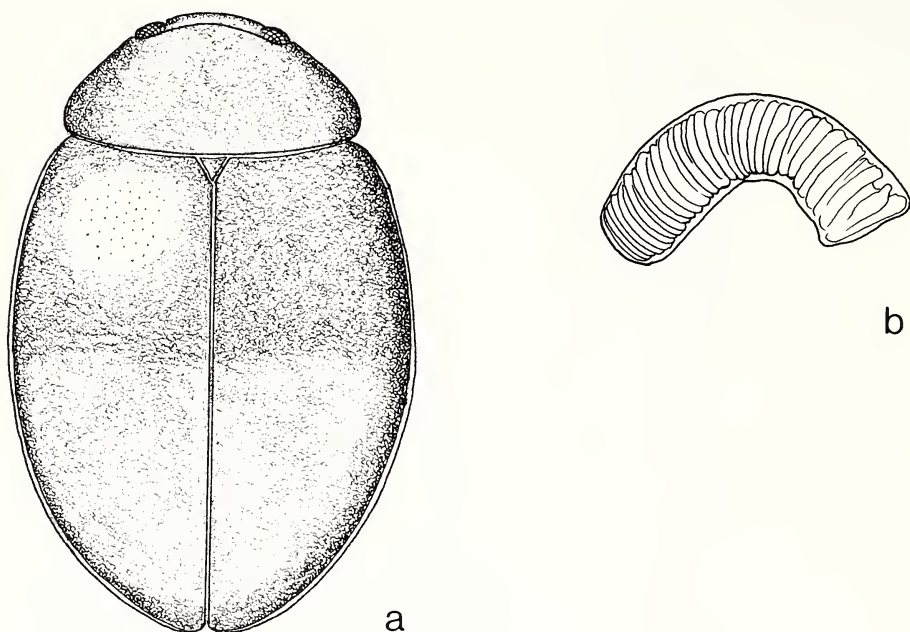


Fig. 252. *Nephus (S.) timberlakei*.

***Nephus (Scymnobioides) timberlakei*, new species**

Fig. 252a, b

Description. Female, length 1.66 mm, width 1.22 mm. Oval, elongate. Color brownish red, elytron dark brown in basal 1/2, dark brown area blended into brownish red of apical ' (Fig. 252a), meso- and metasterna dark brown. Punctures on head and pronotum extremely fine, nearly invisible. Elytron slightly dull, surface alutaceous, coarsely punctured, punctures separated by one to 3 times a diameter; pubescence yellowish white, semi-erect, arranged in S-curve. Postcoxal line parallel, widely separated from hind margin of 1st sternum, not approaching lateral margin. Apex of 6th sternum barely perceptibly emarginate. Female genitalia as in Figure 252b.

Variation. Length 1.66 to 2.0 mm; width 1.22 to 1.33 mm.

Holotype. Female. TEXAS: Brownsville, Apr. 21, '15, Timberlake Coll., Salt Lake Lab No. 9682. USNM (101332).

Paratypes. Total 3. Same data as holotype except collection dates Apr. 4, '15; Apr. 20, '15; Apr. 21, '15. (UCR) (USNM).

This species most closely resembles *N. intrusus*, but *N. timberlakei* is larger and has the elytron bicolored. No males were available for study, so the genitalic affinities remain unknown. I name this species for P. H. Timberlake who first identified it as an undescribed species, in recognition of his fine work in the Coccinellidae.



Fig. 253. Distribution. *Nephus (S.) intrusus* (dot); *N. (S.) gordonii* (star).

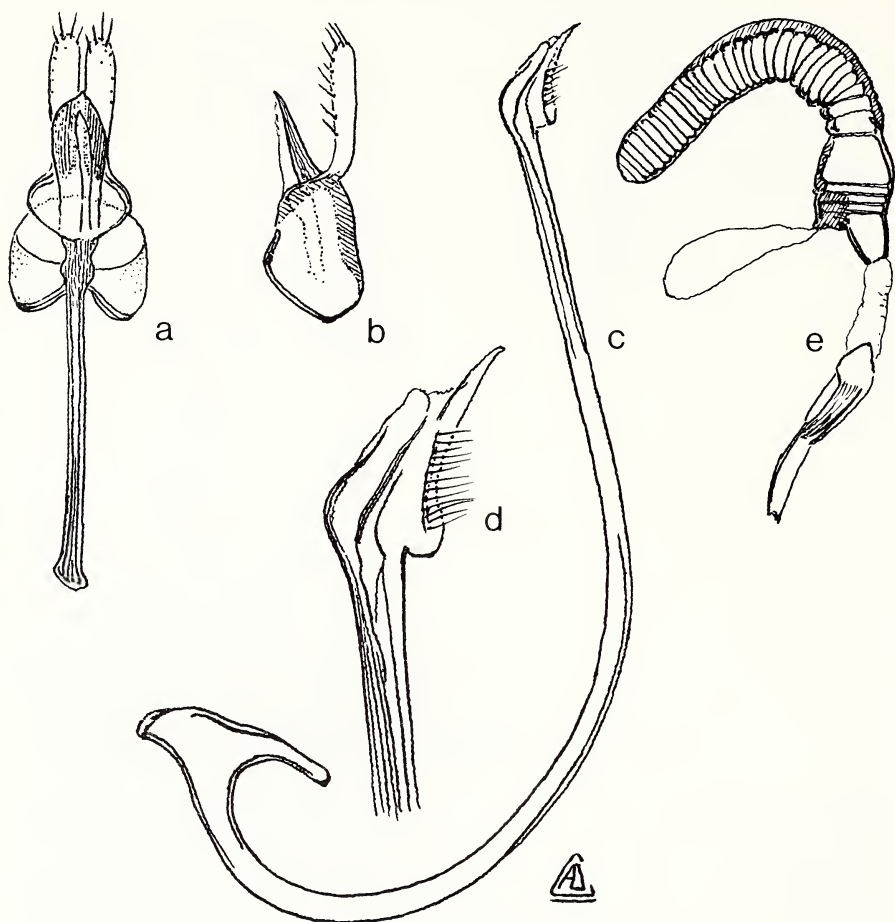


Fig. 254. *Nephus (S.) gordonii*.

Nephus (Scymnobioides) gordonii (Dozier)

Fig. 254a-e; Map, Fig. 253

Scymnus (Scymnobioides) gordonii Dozier, 1971, p. 87.

Nephus (Scymnobioides) gordonii: Gordon, 1976b, p. 315.

For detailed description, and discussion see Gordon, 1976b, p. 315.

Additional locality record: SOUTH CAROLINA: 7 mi. NE Pickens.

Subgenus *Depressoscymnus* Gordon

Depressoscymnus Gordon, 1976b, p. 315. Type-species; *Nephus (Depressoscymnus) schwarzi*, by monotypy.

Antenna short, 10-segmented, basal 2 segments tightly joined, club broad, oval outer margin of segments nearly continuous (Fig. 229f); apical segment of maxillary

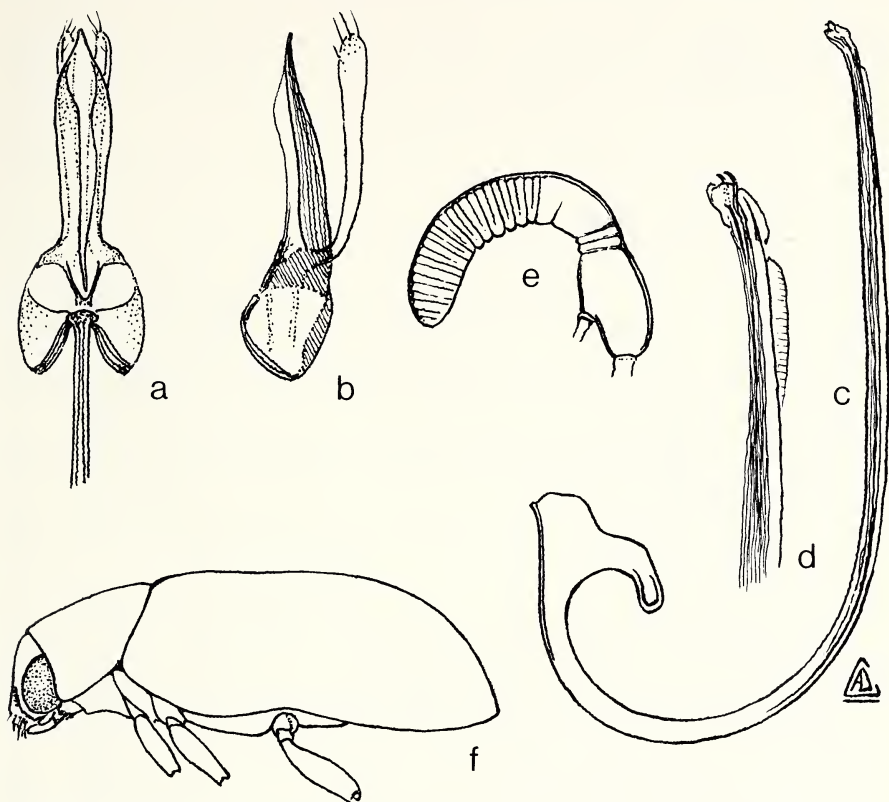


Fig. 255. *Nephus (Depressoscymnus) schwarzi*.

palpus distinctly securiform. Body flattened dorsoventrally (Fig. 255f). Postcoxal line as in *Scymnobioides*. Male genitalia symmetrical; spermathecal capsule of female of the *Scymnobioides* type.

Nephus (Depressoscymnus) schwarzi Gordon

Fig. 255a-f; Map, Fig. 256

Nephus (Depressoscymnus) schwarzi Gordon, 1976b, p. 315.

For detailed description, and discussion see Gordon, 1976b, p. 315.

Additional locality record: ARIZONA: Pima Co., Molino Basin, Mt. Lemmon Hwy., 4,400'.

Genus *Diomus* Mulsant

Scymnus (Diomus) Mulsant, 1850, p. 951.—Gorham, 1897, p. 226.—Casey, 1899, p. 139.—Leng, 1920, p. 213.—Korschevsky, 1931, p. 116.—Mader, 1955, p. 955.—Wingo, 1952, p. 19.—J. Chapin, 1974, p. 35.

Diomus: Weise, 1885a, p. 83.—Mader, 1924, p. 8.—Chapin, 1933, p. 95.—Pope,

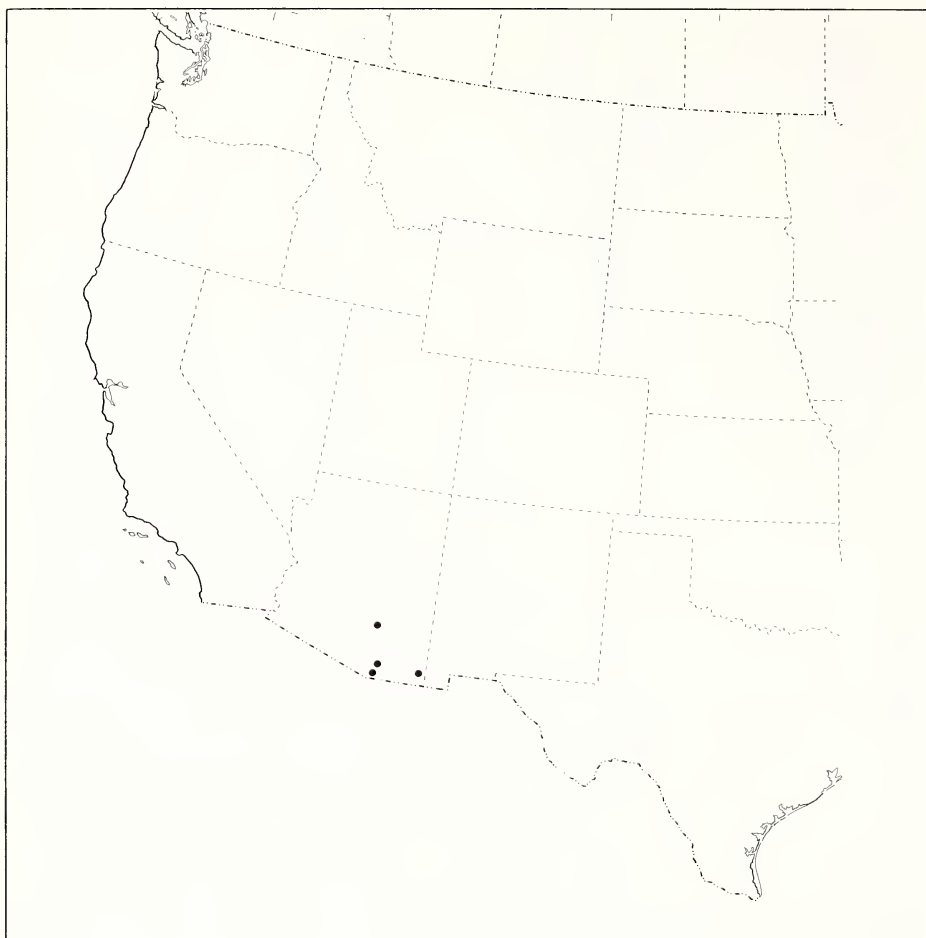


Fig. 256. Distribution. *Nephus (Depressoscymnus) schwarzi*.

1957, p. 311.—Gordon, 1976b, p. 319. Type-species: *Coccinella thoracicus* Fabricius, by subsequent designation of Korschevsky, 1931.

Head with clypeal margin truncate, gena extending onto eye beside antennal insertion; antenna 10-segmented, 3rd segment as long as segments 4–6 combined (Fig. 257a); apical segment of maxillary palpus securiform. Prosternum with 2 fine, complete carinae extending to anterior margin of prosternum. Tarsus 3-segmented. Postcoxal line extending down and joining hind margin of 1st abdominal sternum (Fig. 257b). First abdominal sternum fused to 2nd medially; male with sterna 2–6 contracted, 5th sternum broadly, feebly emarginate apically. Male genitalia with basal lobe asymmetrical; siphon extremely long, slender, or short, evenly curved. Female genitalia with genital plates short, rounded or truncate apically (Fig. 257c); spermatheca long and tangled, or short, simple.

The genus *Diomus* was revised in detail by Gordon (1976b), therefore, only additional locality records and some necessary corrections in synonymy are included for each species. One imported species now established in California is included.

KEY TO SPECIES OF *Diomus*

1. Color completely pale yellow or yellowish brown; length less than 1.40 mm *debilis* (LeConte)
- Color not completely pale, or if so, then length more than 1.40 mm 2
- 2(1). Elytron black with single, obliquely transverse, yellow band, anterior to middle (Fig. 258a); Florida *balteatus* (LeConte)
- Elytron not as described above; Florida and elsewhere 3
- 3(2). Elytron black except apical $\frac{1}{4}$ yellow (Fig. 276e) *terminatus* (Say)
- Elytron not as described above 4
- 4(3). Elytron black or at least dark with irregular yellow areas (Fig. 269d); California *taedatus* (Fall)
- Elytron not as described above; species not occurring in California 5
- 5(4). Elytron dark brown with 2 irregularly connected yellow spots (Fig. 268b); Brownsville, Texas *pseudotaedatus* Gordon
- Elytron not as described above 6
- 6(5). Apex of elytron with a single yellow spot not reaching suture (Fig. 280d) *roseicollis* (Mulsant)
- Elytron not as described above 7
- 7(6). Pronotum yellow with large black median spot; elytron almost completely dark, only narrow border pale, western Texas *texanus* Gordon
- Pronotum and elytron not as described above; not known from western Texas 8
- 8(7). Pronotum yellow; elytron black or dark with sutural and apical margins obviously reddish brown, or entirely light yellowish brown; Arizona *arizonicus* Gordon
- Dorsal color not as described above; not occurring in Arizona 9
- 9(8). Form depressed, oval; elytron dark with 2 rounded, yellow spots (Fig. 266d) *humilis* Gordon
- Form not depressed; elytron rarely with 2 yellow spots (except *myrmidon*) 10
- 10(9). Elytron entirely light reddish brown; Texas *xanthaspis* (Mulsant)
- Elytron either entirely dark or dark with a distinct pale pattern 11
- 11(10). Elytron dark with some form of definite pale markings 14
- Elytron entirely dark or with obscure, indefinite lightening toward apex, or with apical border narrowly yellow 12
- 12(11). Elytron entirely black; coastal California (imported species) *pumilio* Weise
- Elytron not entirely black, or if so, then not occurring in coastal California (native species) 13
- 13(12). Elytron with apex distinctly, narrowly yellow; pronotum entirely reddish yellow or at most with basal, median projection darkened *xanthaspis* (Mulsant)
- Elytron entirely black or dark or with an obscurely paler area on apical half; pronotum usually with at least basal half darkened, often entirely piceous *austrinus* Gordon
- 14(11). Length 1.75 mm, or more; form robust, convex; elytron with 2 somewhat rounded, yellow spots (Fig. 265d) *myrmidon* (Mulsant)
- Length less than 1.80 mm; form not strongly robust or convex; elytron rarely with 2 rounded, yellow spots 15
- 15(14). Elytron with single yellow spot on disc, or with yellow spot on disc narrowly connected to broad, apical, yellow area (Fig. 271e, f); form strongly rounded *bigemmeus* (Horn)

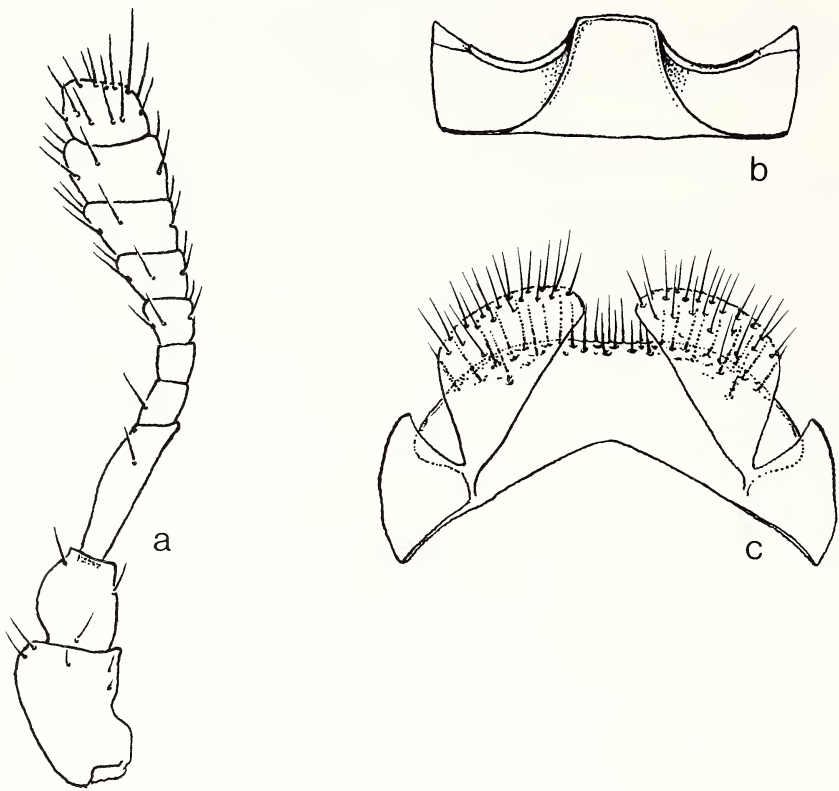


Fig. 257. *Diomus* sp. a. Antenna. b. Postcoxal line. c. Genital plates.

- Elytron with color pattern not as described above; form narrow, elongate, or form short, broad, nearly truncate apically 16
- 16(15). Form elongate, narrow, parallel sided (Fig. 261e-j) 17
- Form short, broad, nearly truncate apically (Fig. 263d) *liebecki* (Horn)
- 17(16). Basal lobe of male genitalia robust, strongly asymmetrical in ventral view (Fig. 261a) *amabilis* (LeConte)
- Basal lobe of male genitalia slender, not strongly asymmetrical in ventral view (Fig. 260a) *floridanus* (Mulsant)

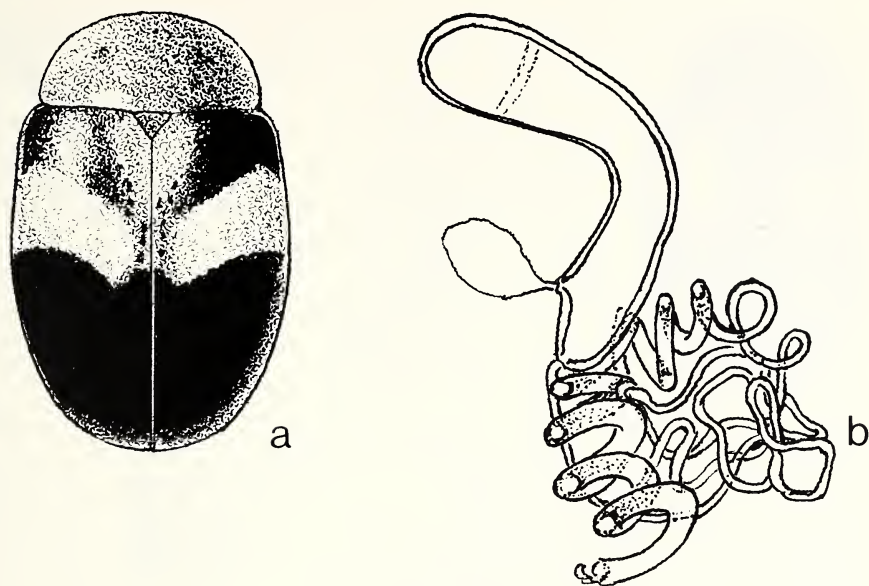


Fig. 258. *Diomus balteatus*.

Diomus balteatus (LeConte)

Fig. 258a-b; Map, Fig. 259

Scymnus balteatus LeConte, 1878a, p. 399.—Horn, 1895, p. 87.

Scymnus (Diomus) balteatus: Casey, 1899, p. 156.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 155.

Diomus balteatus: Gordon, 1976b, p. 322.

For detailed description, and discussion see Gordon, 1976b, p. 322.

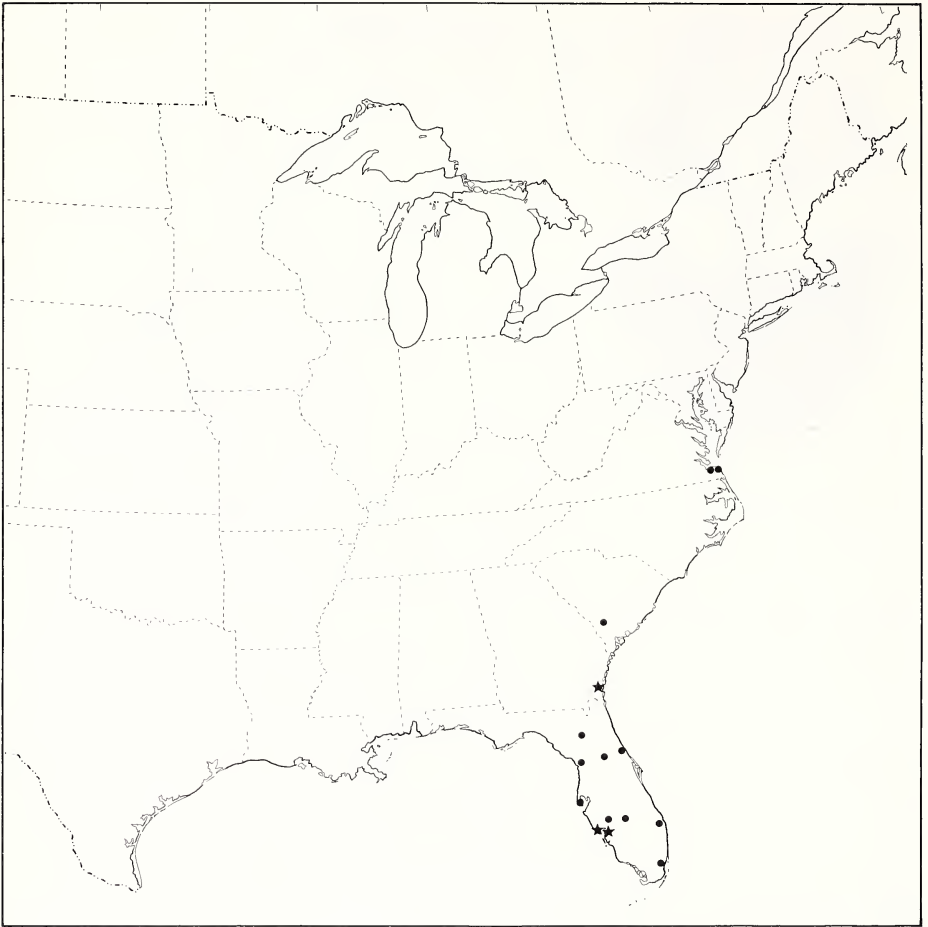


Fig. 259. Distribution. *Diomus balteatus* (star); *D. floridanus* (dot).

Diomus floridanus (Mulsant)

Fig. 260a-e; Map, Fig. 259

Hyperapis floridana Mulsant, 1850, p. 1040.—Casey, 1899, p. 128.

Scymnus floridana: Crotch, 1873, p. 379.—Dobzhansky, 1941, p. 85.

Scymnus quadritaeniatus LeConte, 1878a, p. 400.—Horn, 1895, p. 90.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 165.—Gordon, 1976b, p. 323.

Scymnus (Diomus) quadritaeniatus: Casey, 1899, p. 157.

Scymnus pello Blatchley, 1927, p. 142.—Leng and Mutchler, 1933, p. 35.—Korschefsky, 1931, p. 164.—Gordon, 1976b, p. 323.

Diomus floridanus: Gordon, 1976b, p. 322.

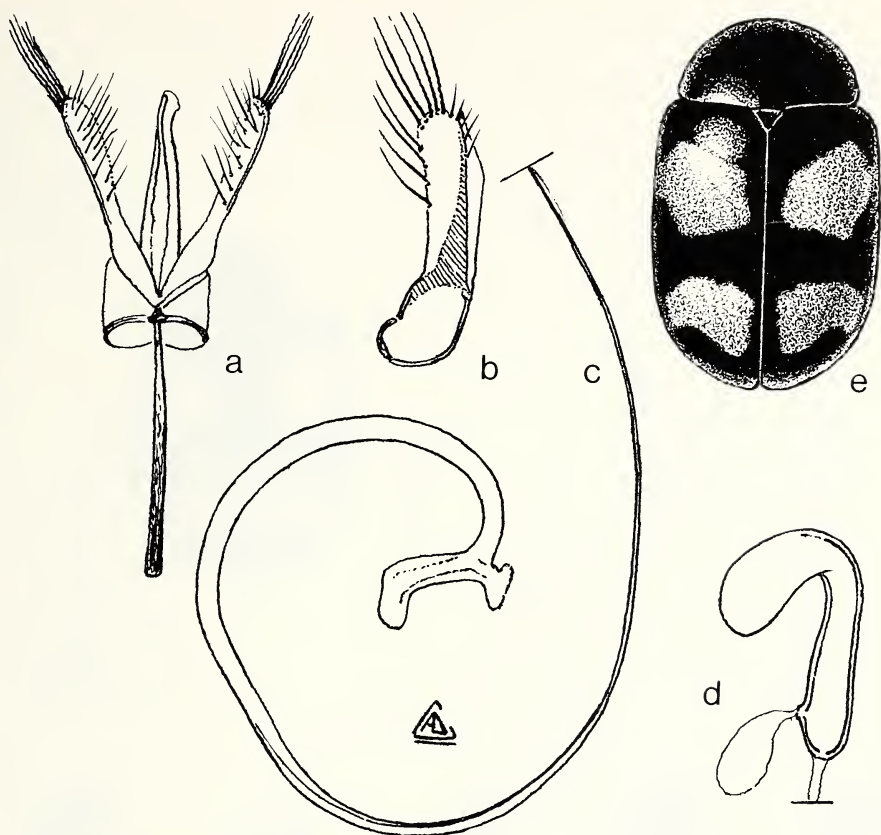


Fig. 260. *Diomus floridanus*.

For detailed description, and discussion see Gordon, 1976b, p. 322.

Additional locality record: FLORIDA: Gainesville.

Diomus amabilis (LeConte)

Fig. 261a-e; Map, Fig. 262

Scymnus amabilis LeConte, 1852, p. 135.—Crotch, 1874b, p. 260.—Horn, 1895, p. 94.

Scymnus (Scymnobioides) amabilis: Casey, 1899, p. 160.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 154.

Scymnus (Diomus) dulcis Casey, 1899, p. 159.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 158.—Gordon, 1976b, p. 326.

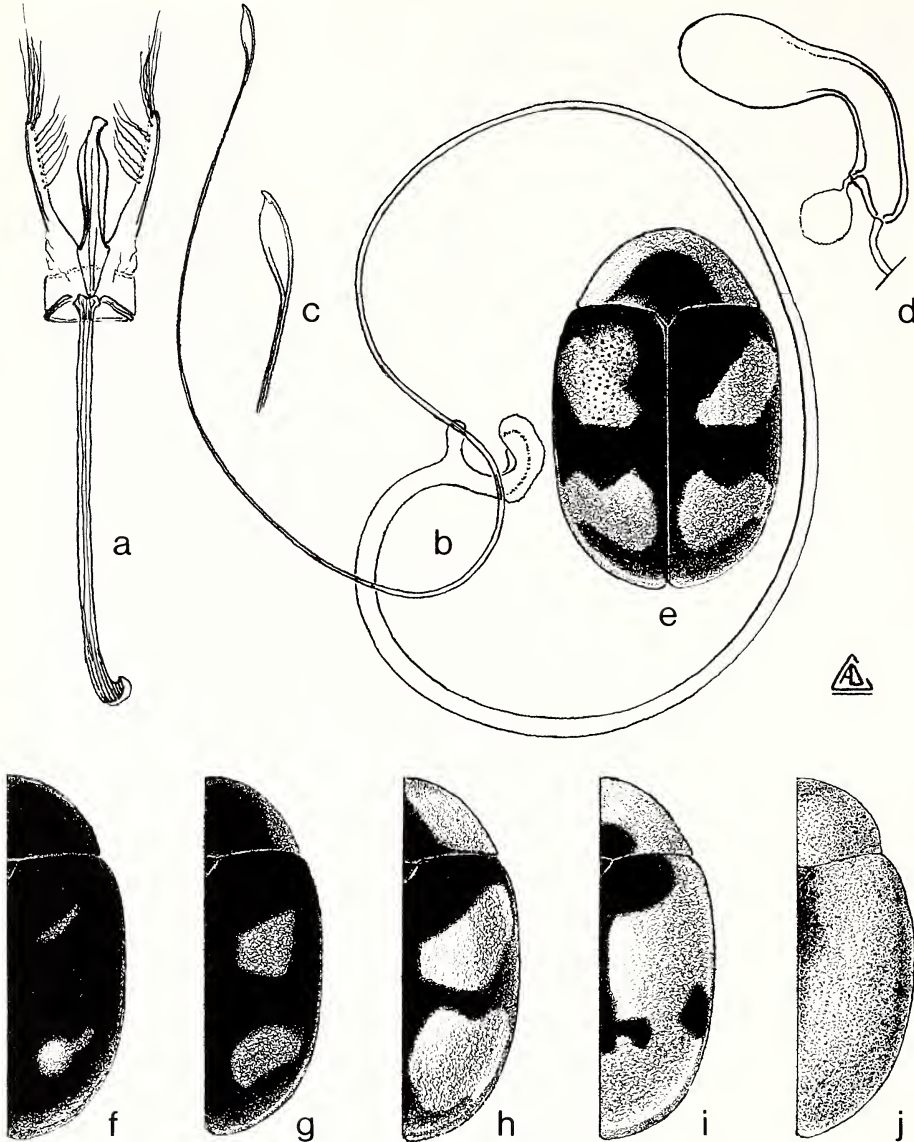


Fig. 261. *Diomus amabilis*.

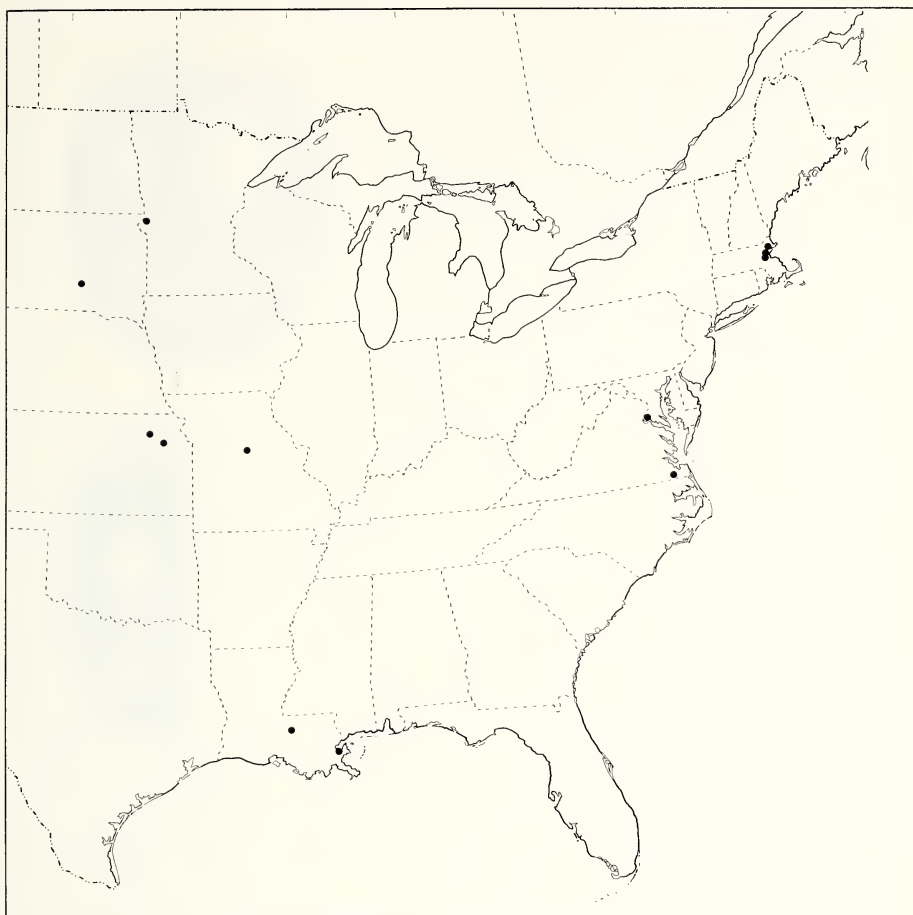


Fig. 262. Distribution. *Diomus amabilis*.

Scymnus (Diomus) emertoni Casey, 1924, p. 172.—Leng and Mutchler, 1927, p. 33.—Korschefsky, 1931, p. 158.—Gordon, 1976b, p. 326.

Scymnus (Diomus) amabilis: Wingo, 1952, p. 43.—J. Chapin, 1974, p. 35.

Diomus amabilis: Gordon, 1976b, p. 326.

For detailed description, and discussion see Gordon, 1976b, p. 326.

Additional locality record: MISSOURI: Columbia.

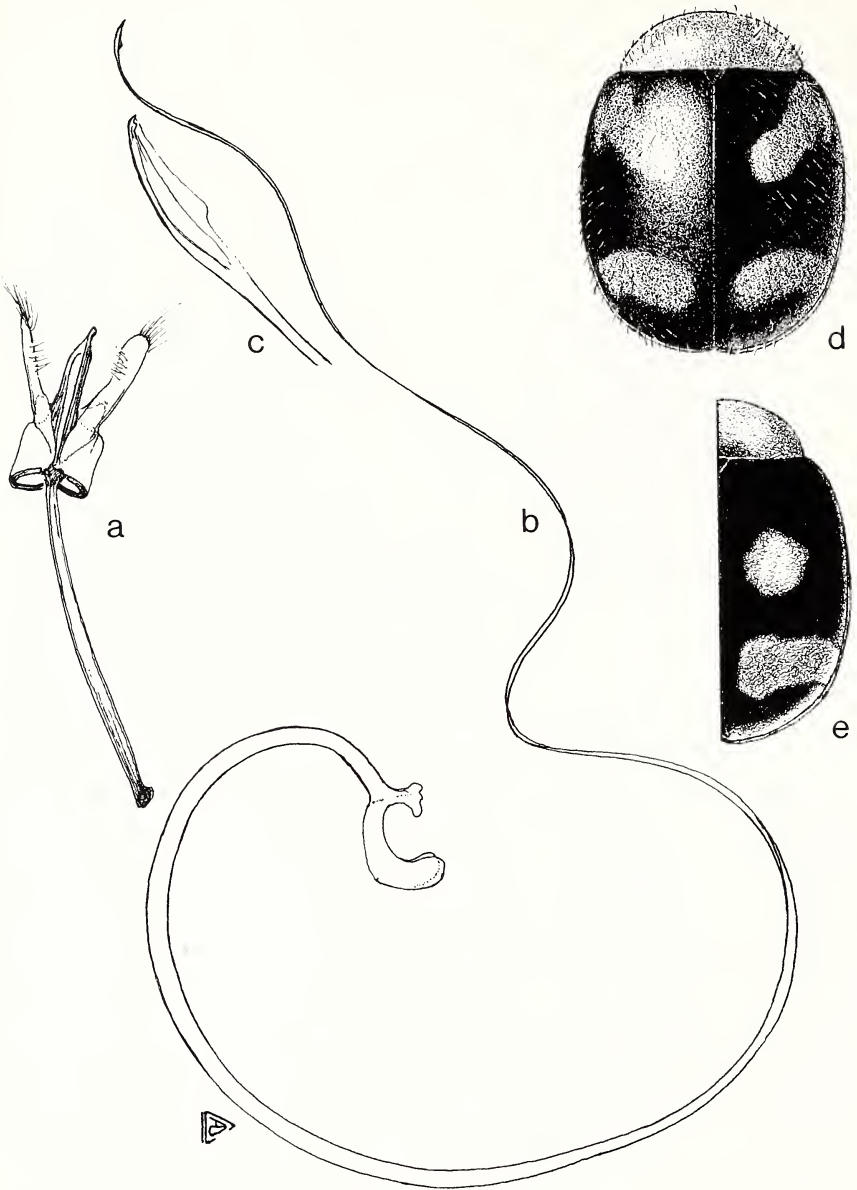


Fig. 263. *Diomus liebecki*.

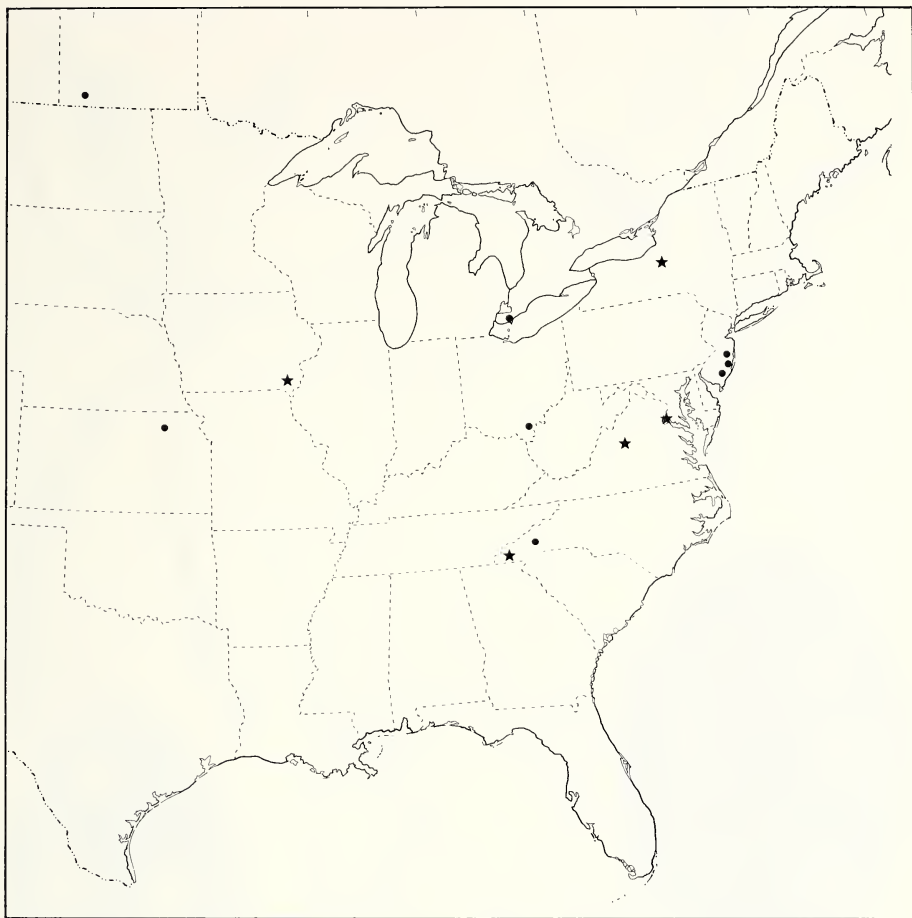


Fig. 264. Distribution. *Diomus liebecki* (dot); *D. myrmidon* (star).

Diomus liebecki (Horn)

Fig. 263a-e; Map, Fig. 264

Scymnus liebecki Horn, 1895, p. 89.—Blatchley, 1910, p. 527.

Scymnus (Diomus) liebecki: Casey, 1899, p. 157.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 161.—Wingo, 1952, p. 43.

Scymnus (Diomus) adulans Casey, 1899, p. 157.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 153.—Gordon, 1976b, p. 329.

Scymnus (Diomus) ohioensis Stehr, 1946, p. 80.—Gordon, 1976b, p. 329.

Diomus liebecki: Gordon, 1976b, p. 329.

For detailed description, and discussion see Gordon, 1976b, p. 329.

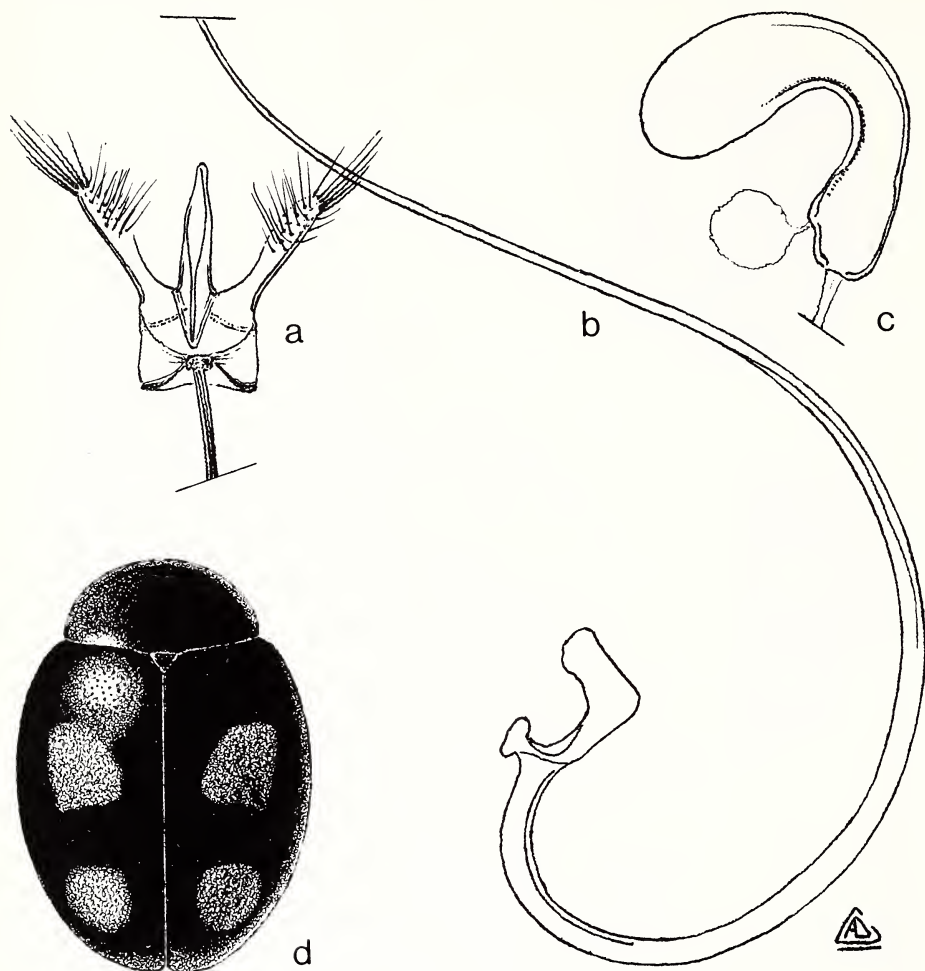


Fig. 265. *Diomus myrmidon*.

Diomus myrmidon (Mulsant)

Fig. 265a-d; Map, Fig. 264

Scymnus (*Diomus*) *myrmidon* Mulsant, 1850, p. 954.—Crotch, 1874b, p. 261.—

Casey, 1899, p. 157.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 162.

Scymnus myrmidon: LeConte, 1852, p. 136.—Horn, 1895, p. 89.

Diomus myrmidon: Gordon, 1976b, p. 331.

For detailed description, and discussion see Gordon, 1976b, p. 331.

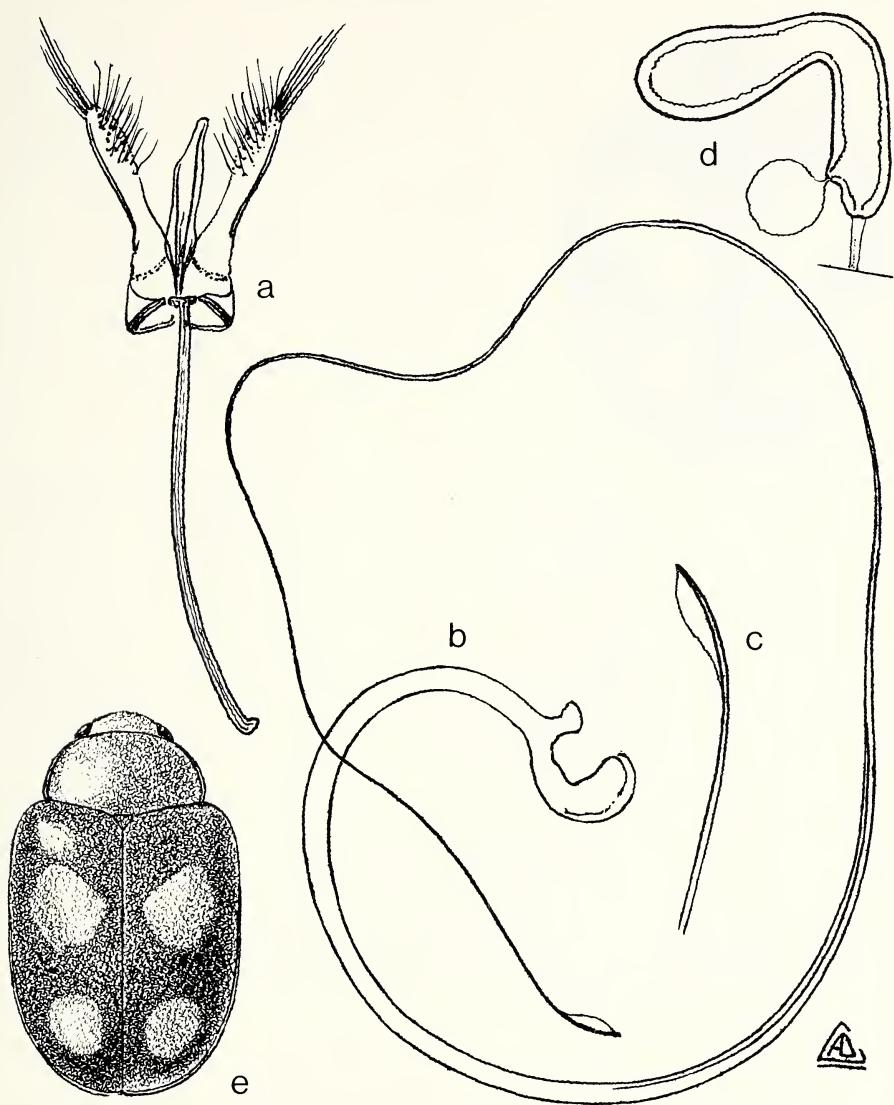


Fig. 266. *Diomus humilis*.

Diomus humilis Gordon
Fig. 266a-d; Map, Fig. 267

Diomus humilis Gordon, 1976b, p. 333.

For detailed description, and discussion see Gordon, 1976b, p. 333.
Additional locality record: FLORIDA: Punta Gorda.

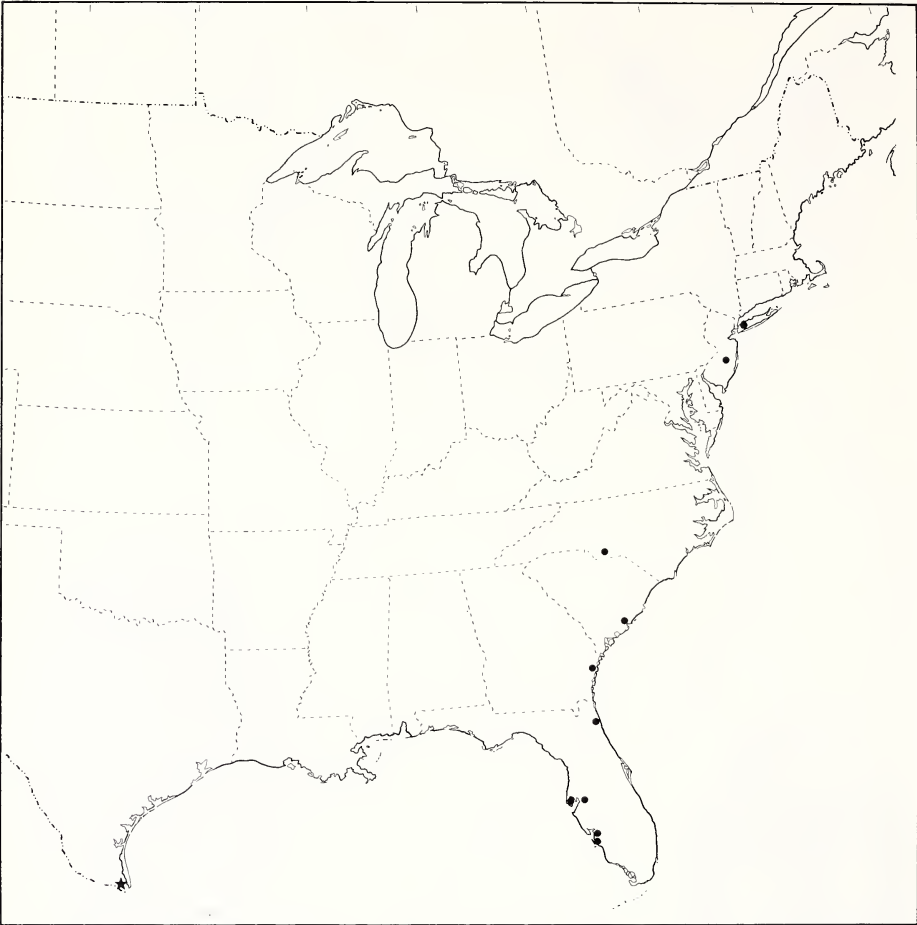


Fig. 267. Distribution. *Diomus humilis* (dot); *D. pseudotaedatus* (star).

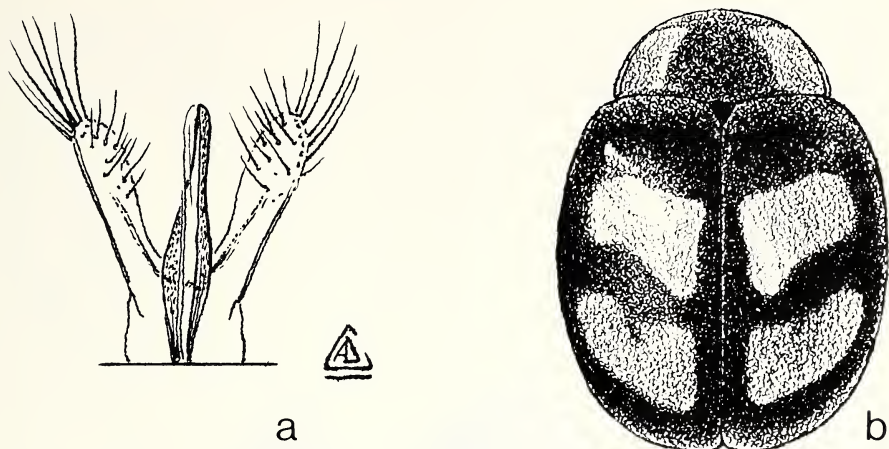


Fig. 268. *Diomus pseudotaedatus*.

Diomus pseudotaedatus Gordon

Fig. 268a, b; Map, Fig. 267

Diomus pseudotaedatus Gordon, 1976b, p. 333.

For detailed description, and discussion see Gordon, 1976b, p. 333.

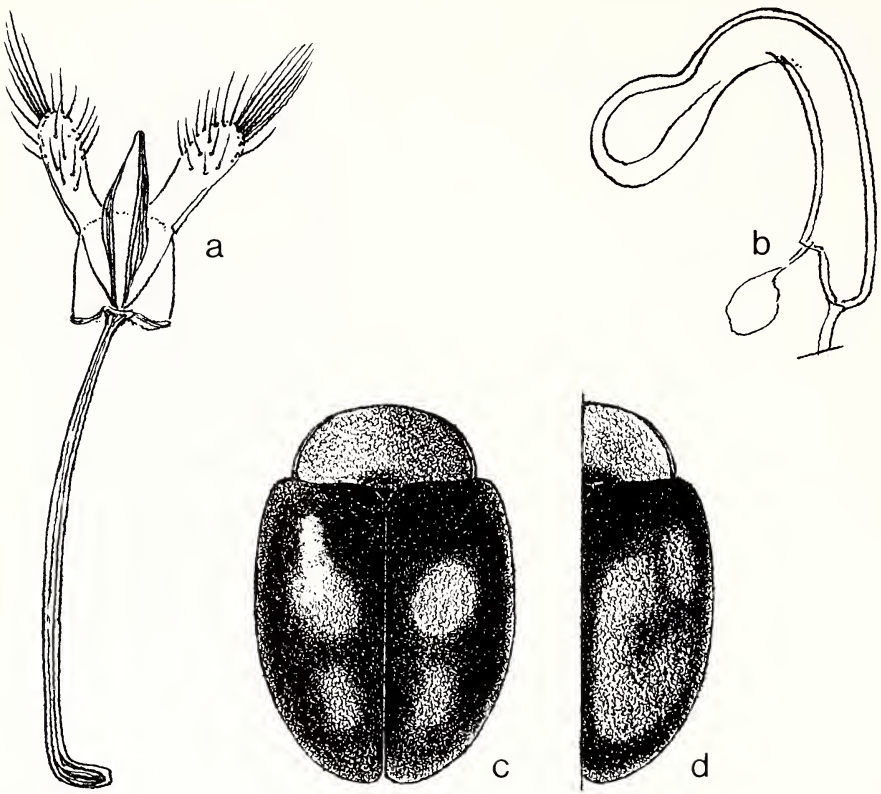


Fig. 269. *Diomus taedatus*.

Diomus taedatus (Fall)

Fig. 269a-d; Map, Fig. 270

Scymnus taedatus Fall, 1901, p. 233.

Scymnus (Diomus) taedatus: Leng, 1920, p. 213.—Korschefsky, 1931, p. 166.

Diomus taedatus: Gordon, 1976b, p. 335.

For detailed description and discussion see Gordon, 1976b, p. 335.

Additional locality record: ARIZONA: Santa Cruz Co., Madera Canyon.

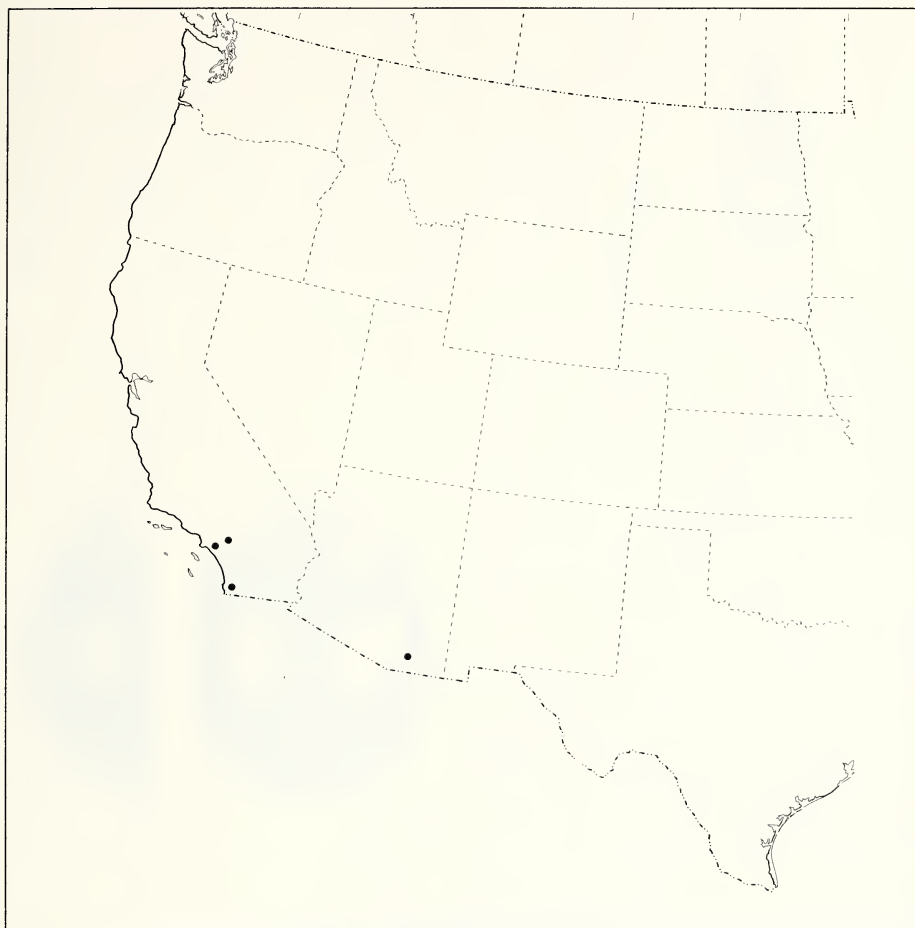


Fig. 270. Distribution. *Diomus taedatus*.

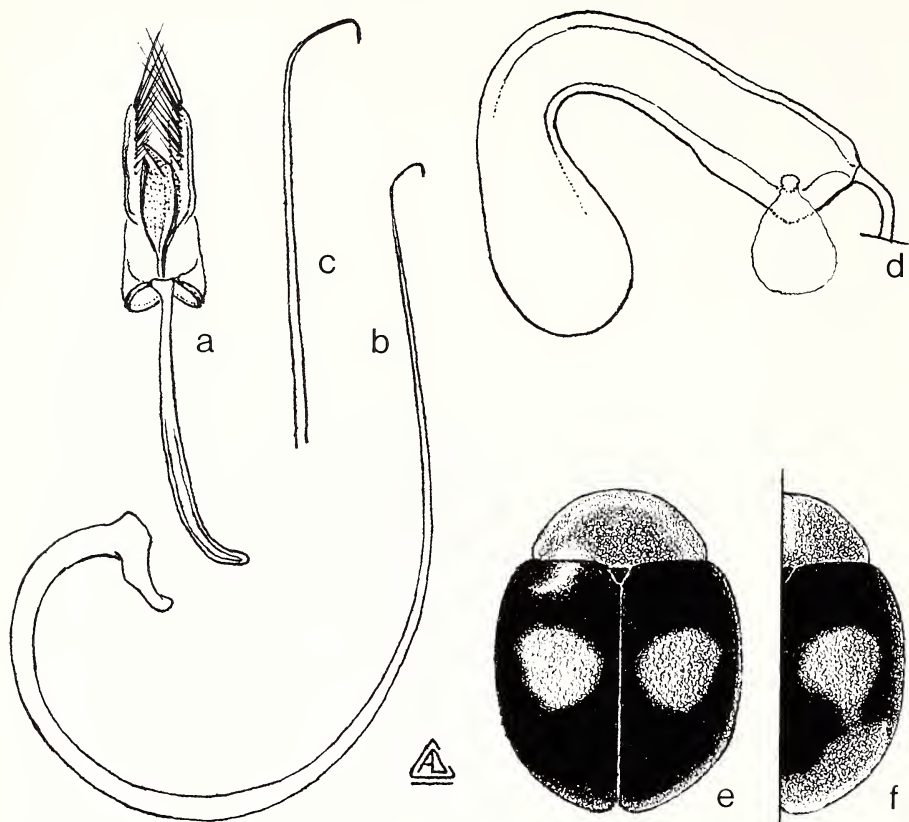


Fig. 271. *Diomus bigemmeus*.

Diomus bigemmeus (Horn)

Fig. 271a-f; Map, Fig. 272

Scymnus bigemmeus Horn, 1895, p. 87.—Blatchley, 1918, p. 421.

Scymnus (*Diomus*) *bigemmeus*: Casey, 1899, p. 156.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 155.—J. Chapin, 1974, p. 36.

Scymnus (*Diomus*) *stigma* Casey, 1899, p. 158. (not Weise, 1898b).—Leng, 1920, p. 214.—Weise, 1929, p. 33.—Gordon, 1976b, p. 338.

Scymnus lunaris Weise, 1929, p. 33.—Korschefsky, 1931, p. 161.—Gordon, 1976b, p. 338.

Diomus bigemmeus: Gordon, 1976b, p. 337.

For detailed description, and discussion see Gordon, 1976b, p. 337.

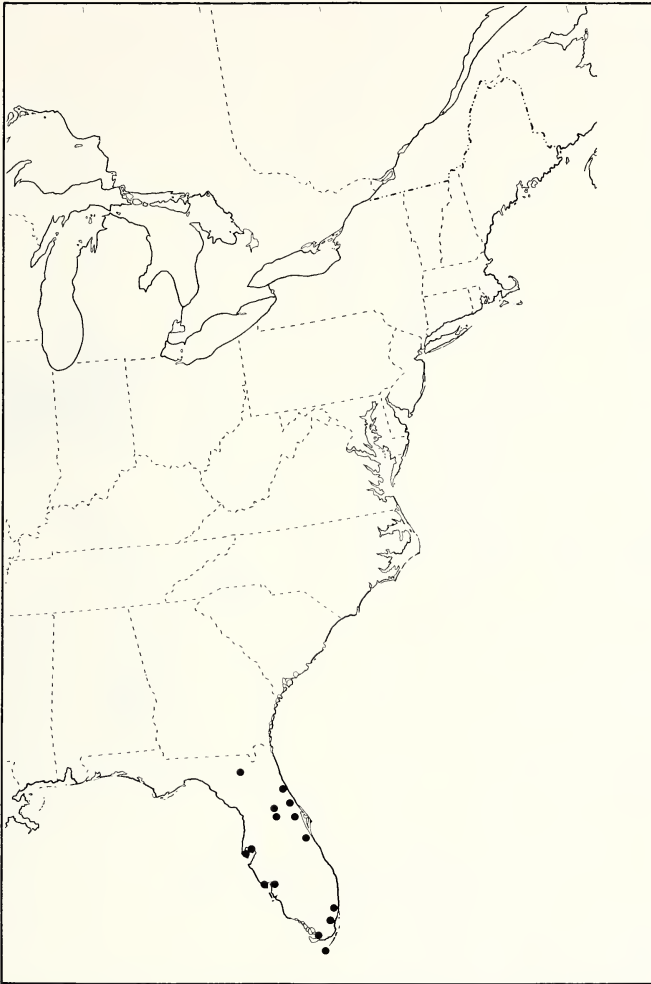


Fig. 272. Distribution. *Diomus bigemmeus*.

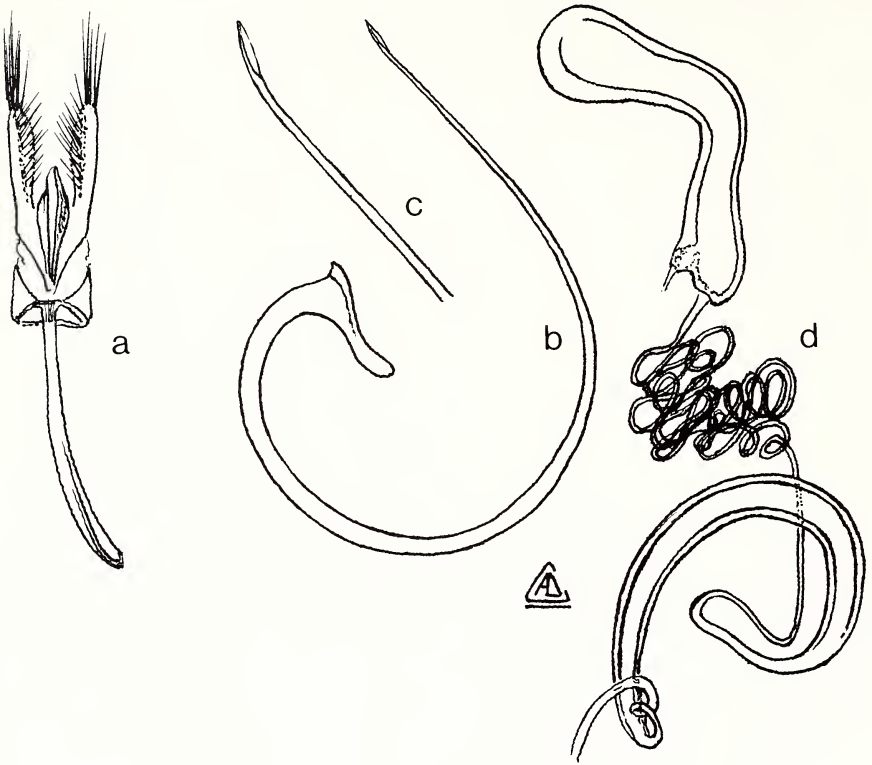


Fig. 273. *Diomus austrinus*.

Diomus austrinus Gordon
Fig. 273a-d; Map, Fig. 274

Diomus austrinus Gordon, 1976b, p. 341.

For detailed description, and discussion see Gordon, 1976b, p. 341.

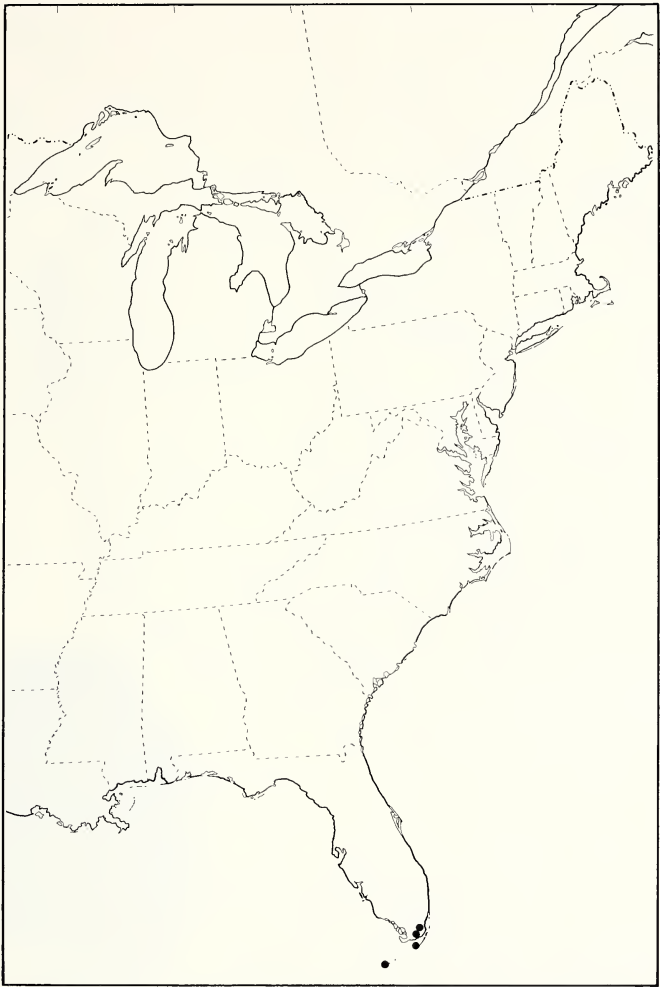


Fig. 274. Distribution. *Diomus austrinus*.

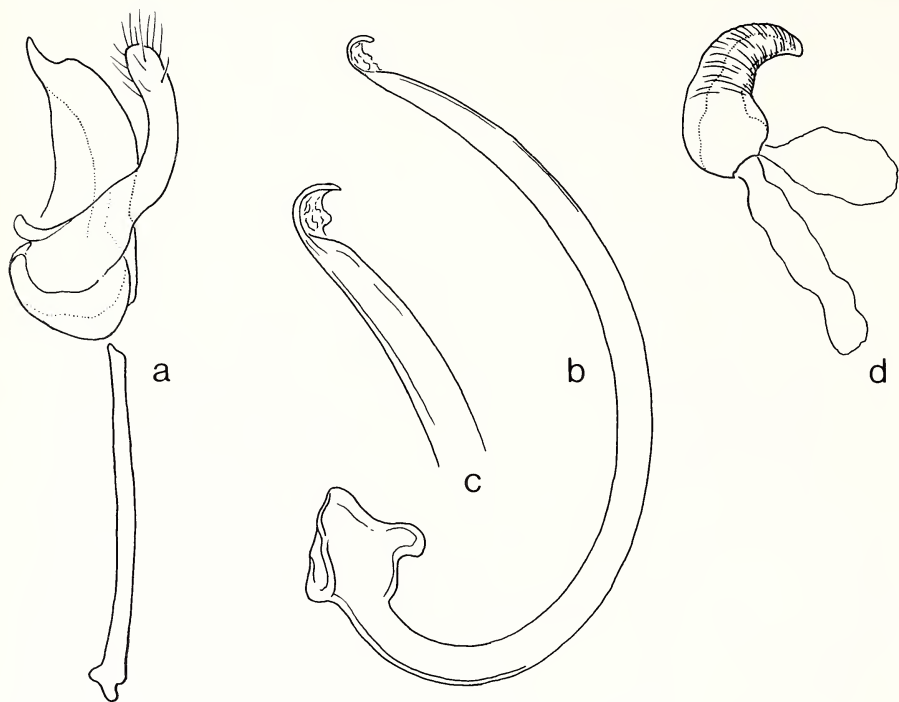


Fig. 275. *Diomus pumilio*.

Diomus pumilio Weise
Fig. 275a-d; Map, Fig. 279

Diomus pumilio Weise, 1885b, p. 237.—Korschefsky, 1931, p. 148.

Scymnus flavifrons Blackburn, 1889, p. 95.—Blackburn, 1892, p. 250.

Scymnus (Scymnobioides) pumilio: Hatch, 1961, p. 153.

Diagnosis. Length 1.35 to 1.60 mm, width 1.0 to 1.20 mm. Form oval, somewhat oblong. Color black except male with anterior pronotal margin, head, propleuron, mouthparts, and anterior leg reddish yellow. Male genitalia as in Figure 275a-c. Female genitalia as in Figure 275d.

Discussion. This is an Australian species imported several times into the United States and Canada, now known to be established only in coastal California (K. Hagen, pers. comm.).

Type locality. Of *pumilio* and *flavifrons*, South Australia.

Type depository. Of *pumilio* and *flavifrons*, types not examined.

Distribution. Figure 279. CALIFORNIA: Marin Co. to San Diego (coastal).

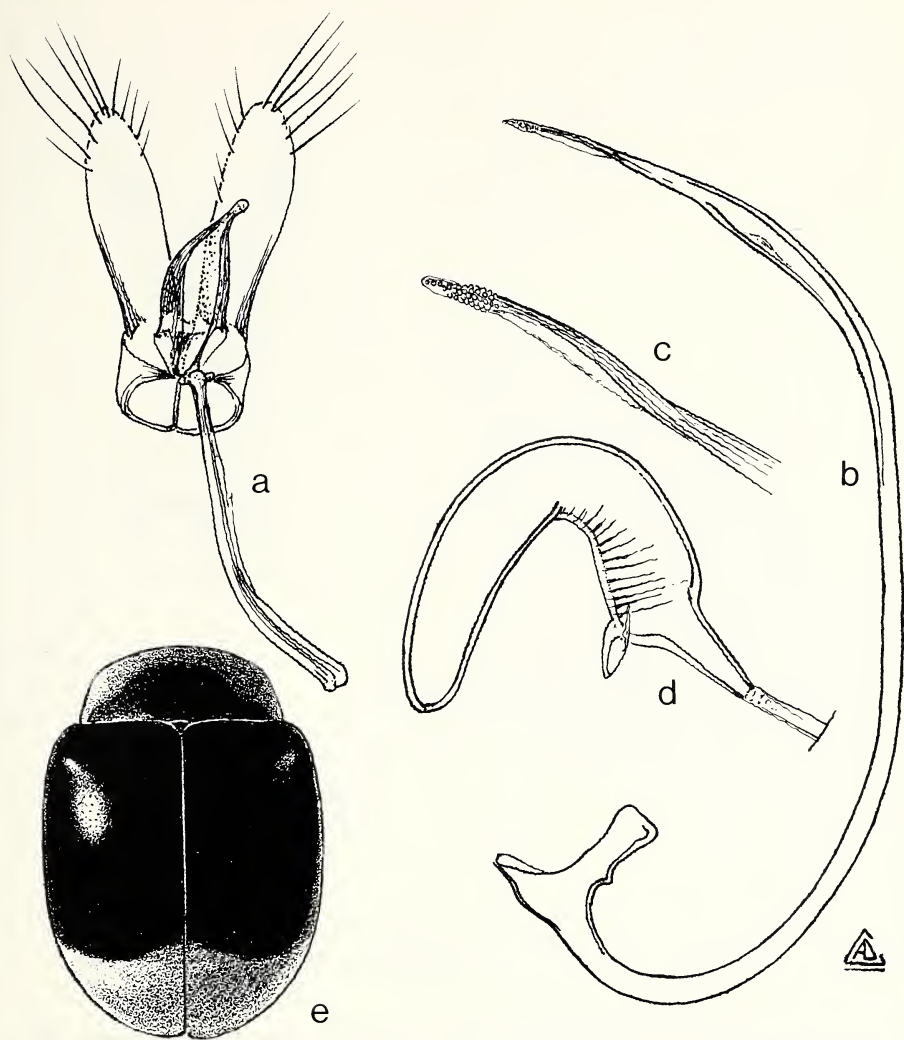


Fig. 276. *Diomus terminatus*.

Diomus terminatus (Say)

Fig. 276a-e; Map, Fig. 277

Scymnus terminatus Say, 1835, p. 203.—LeConte, 1852, p. 136.—Crotch, 1874b, p. 259.—Horn, 1895, p. 90.

Scymnus (*Diomus*) *terminatus*: Mulsant, 1850, p. 952.—Casey, 1899, p. 158.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 166.—Wingo, 1952, p. 43.—J. Chapin, 1974, p. 36.

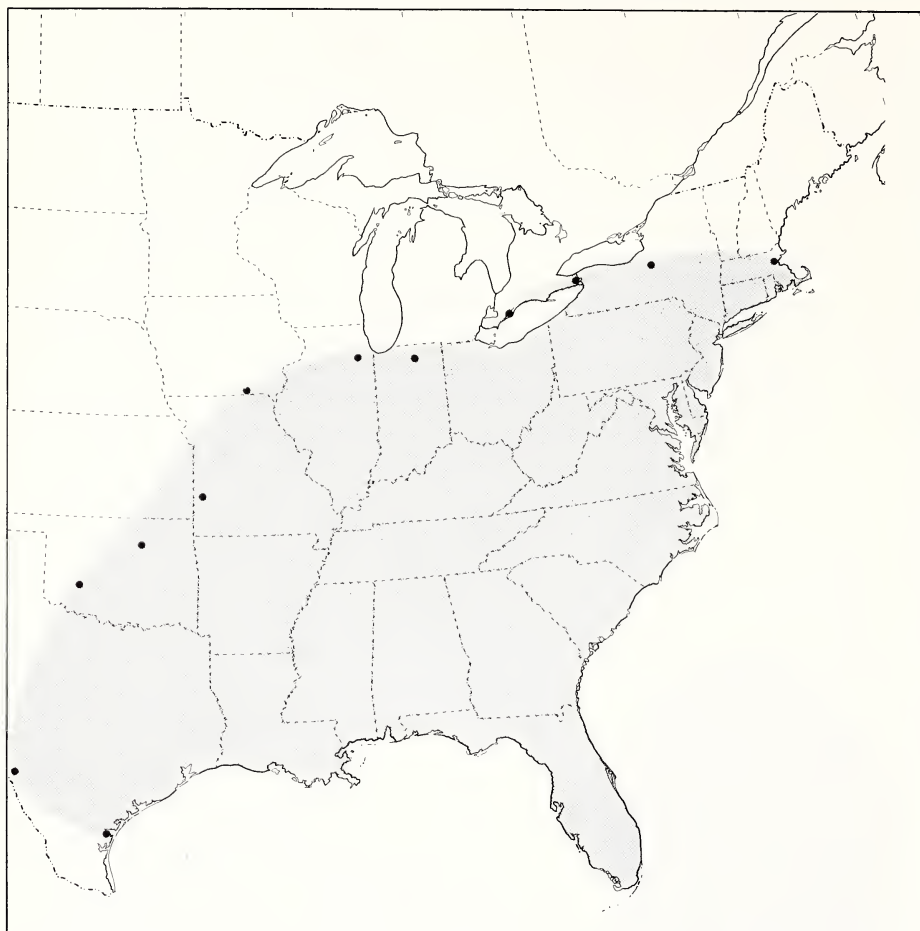


Fig. 277. Distribution. *Diomus terminatus* (peripheral localities dotted).

Scymnus femoralis LeConte, 1852, p. 136.—Crotch, 1874b, p. 260.—Horn, 1895, p. 91.

Scymnus (Diomus) femoralis: Casey, 1899, p. 158.—Leng, 1920, p. 214.

Scymnus (Diomus) terminatus ab. *femoralis*: Korschefsky, 1931, p. 167.

Scymnus (Diomus) partitus Casey, 1899, p. 158.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 164.—J. Chapin, 1974, p. 36.—Gordon, 1976b, p. 342.

Diomus terminatus: Gordon, 1976b, p. 341.

For detailed description, and discussion see Gordon, 1976b, p. 341.

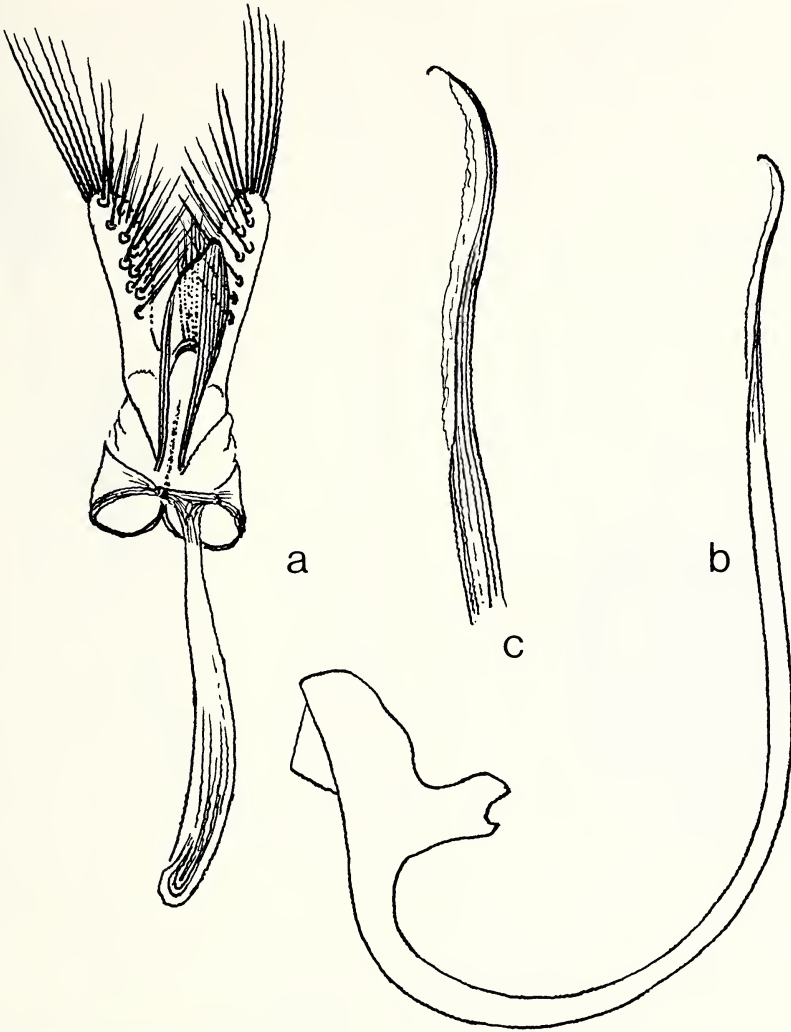


Fig. 278. *Diomus texanus*.

Diomus texanus Gordon
Fig. 278a-c; Map, Fig. 279

Diomus texanus Gordon, 1976b, p. 346.

For detailed description, and discussion see Gordon, 1976b, p. 346.

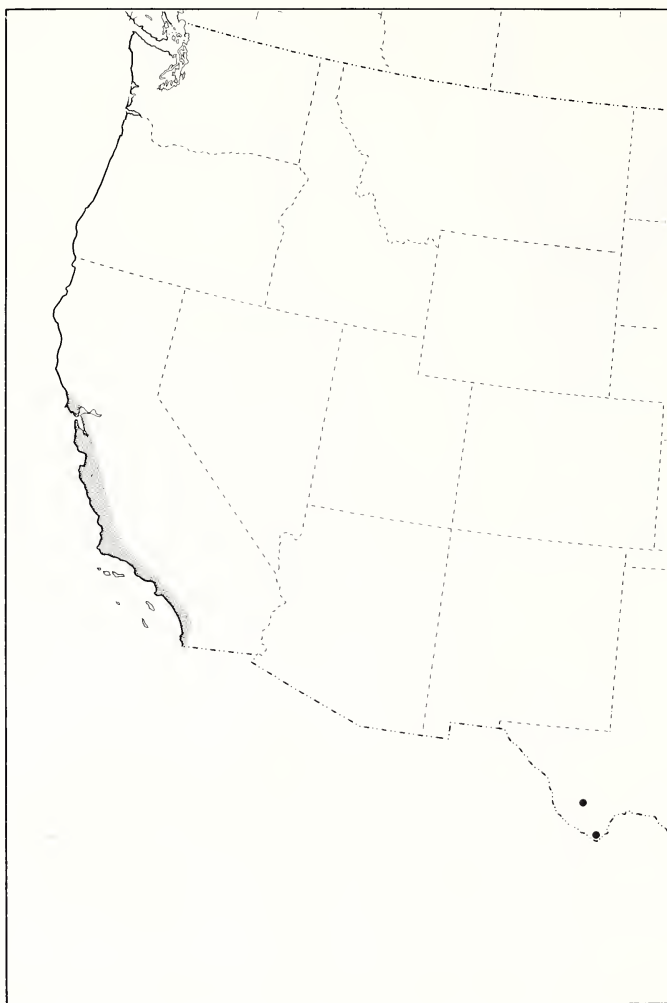


Fig. 279. Distribution. *Diomus texanus* (dot); *D. pumilio* (shaded).

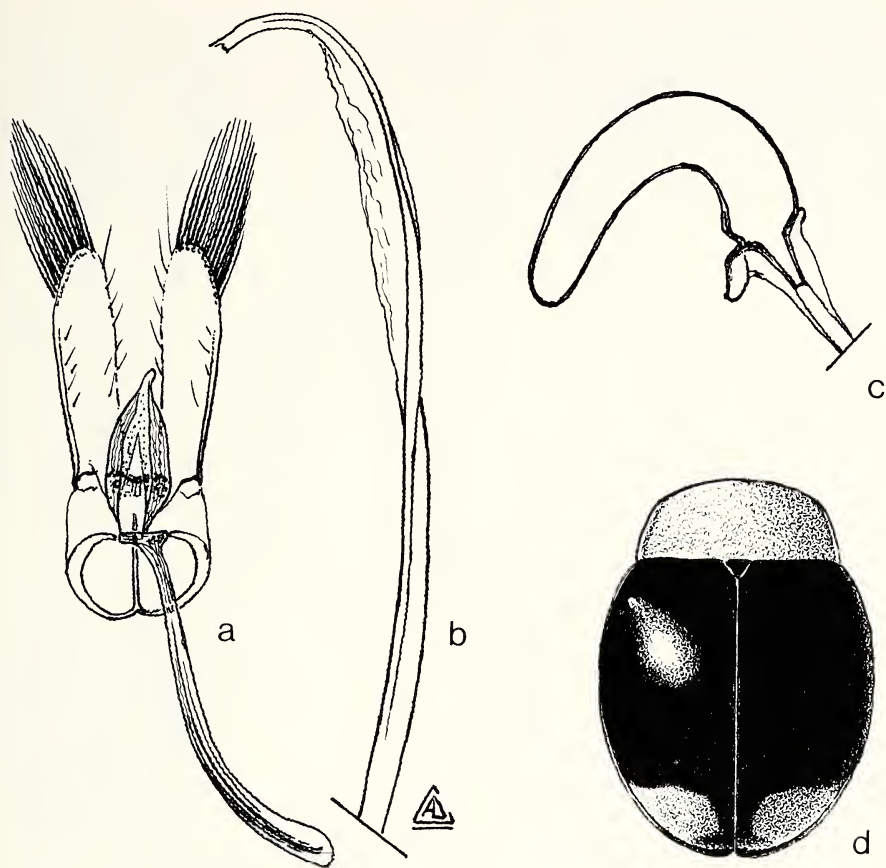


Fig. 280. *Diomus roseicollis*.

Diomus roseicollis (Mulsant)

Fig. 280a–d; Map, Fig. 281

Scymnus (*Diomus*) *roseicollis* Mulsant, 1853, p. 142.—Korschefsky, 1931, p. 165.

Scymnus roseicollis: Crotch, 1874b, p. 270.—Dimmock, 1906, p. 382.

Diomus roseicollis: Gordon, 1976b, p. 348.

For detailed description, and discussion see Gordon, 1976b, p. 348.



Fig. 281. Distribution. *Diomus roseicollis* (star); *D. xanthaspis* (dot).

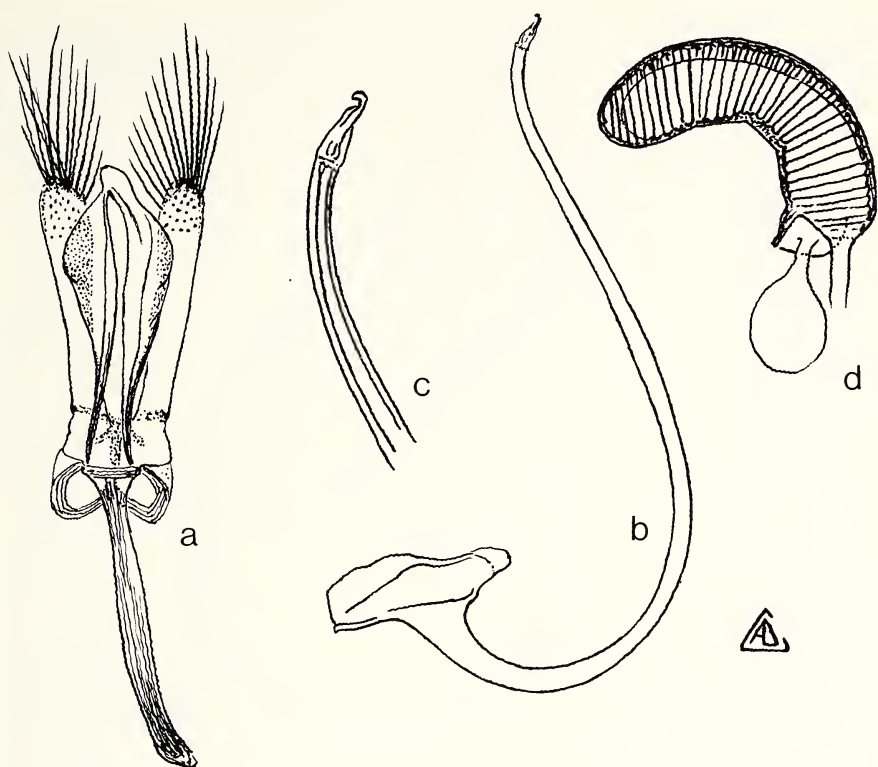


Fig. 282. *Diomus xanthaspis*.

Diomus xanthaspis (Mulsant)

Fig. 282a-d; Map, Fig. 281

Scymnus (Diomus) xanthaspis Mulsant, 1850, p. 952.—Horn, 1895, p. 90.—Casey, 1899, p. 160.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 167.—Wingo, 1952, p. 43.—J. Chapin, 1974, p. 37.

Scymnus xanthaspis: LeConte, 1852, p. 136.—Crotch, 1874b, p. 259.

Scymnus (Diomus) houstoni Casey, 1899, p. 158.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 160.—Gordon, 1976b, p. 350.

Scymnus (Diomus) appalacheus Casey, 1899, p. 158.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 154.—Gordon, 1976b, p. 350.

Scymnus (Diomus) brunnescens Casey, 1899, p. 158 (not Motschulsky, 1866).—Leng, 1920, p. 214.—Weise, 1929, p. 33.—Korschefsky, 1931, p. 154.—Gordon, 1976b, p. 350.

Scymnus caseyi Weise, 1929, p. 33 (not Brethes, 1924).—Korschefsky, 1931, p. 167.—Gordon, 1976b, p. 350.

Scymnus caseyanus Leng and Mutchler, 1933, p. 35.

Diomus xanthaspis: Gordon, 1976b, p. 348.

For detailed description, and discussion see Gordon, 1976b, p. 348.

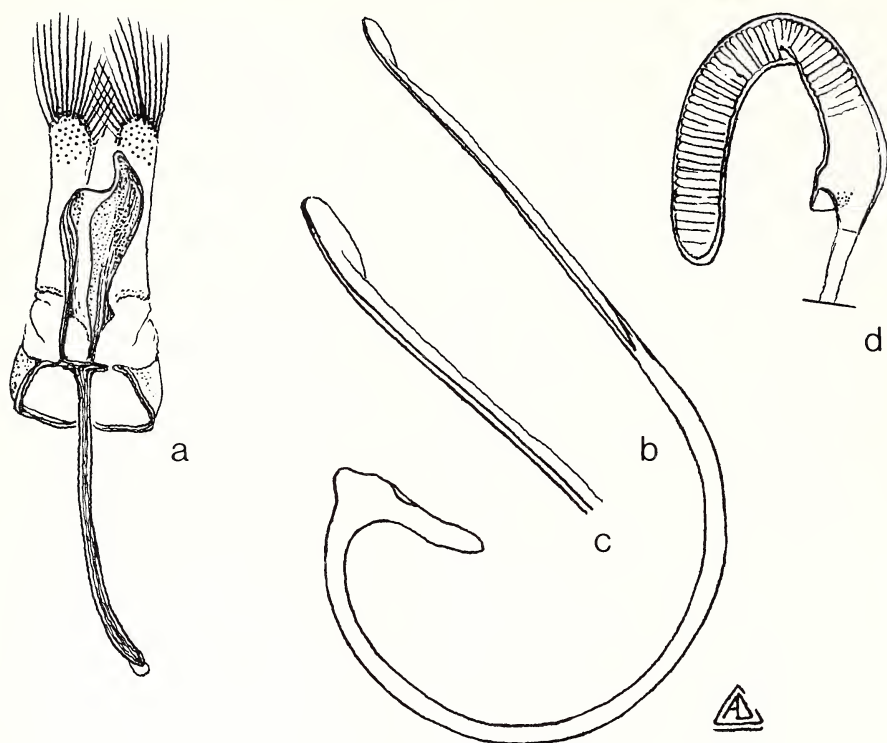


Fig. 283. *Diomus arizonicus*.

Diomus arizonicus Gordon
Fig. 283a-d; Map, Fig. 284

Diomus arizonicus Gordon, 1976b, p. 353.

For detailed description, and discussion see Gordon, 1976b, p. 353.



Fig. 284. Distribution. *Diomus arizonicus*.

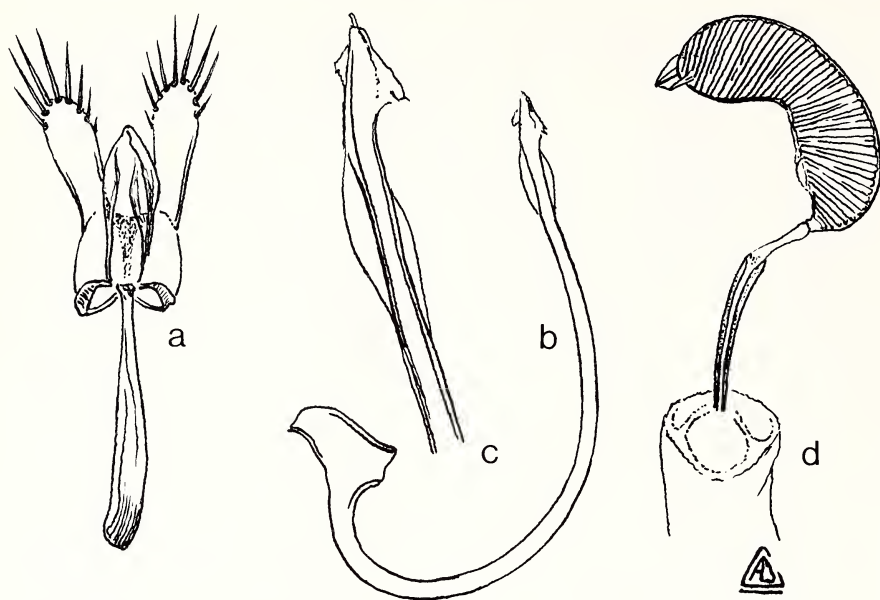


Fig. 285. *Diomus debilis*.

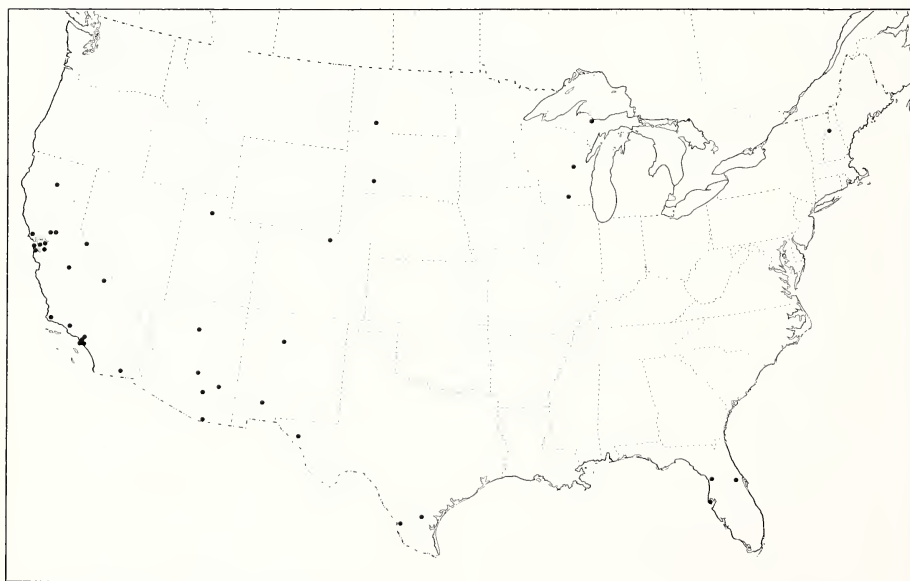


Fig. 286. Distribution. *Diomus debilis*.

Diomus debilis (LeConte)

Fig. 285a-d; Map, Fig. 286

Scymnus debilis LeConte, 1852, p. 137.—Crotch, 1874b, p. 263.—Horn, 1895, p. 91.

Scymnus (Diomus) debilis: Casey, 1899, p. 159.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 157.

Scymnus (Diomus) pusio Casey, 1899, p. 159.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 165.—Gordon, 1976b, p. 354.

Scymnus (Diomus) aeger Casey, 1899, p. 159.—Leng, 1920, p. 214.—Wingo, 1952, p. 43.—Gordon, 1976b, p. 354.

Scymnus (Diomus) molliculus Casey, 1924, p. 175.—Leng and Mutchler, 1927, p. 33.—Wingo, 1952, p. 43.—Gordon, 1976b, p. 354.

Scymnus (Diomus) minutissimus Casey, 1924, p. 176 (not de Villers, 1789).—Leng and Mutchler, 1927, p. 33.—Gordon, 1976b, p. 354.

Scymnus (Diomus) minor Korschefsky, 1931, p. 162.

Diomus debilis (LeConte): Gordon, 1976b, p. 354.

For detailed synonymy, description, and discussion see Gordon, 1976b, p. 354.

Additional locality records: CALIFORNIA: El Centro; Inyo Co., Saline Valley. TEXAS: Hudspeth Co., 10 mi. S. Cornudas.

Selvadiini, new tribe

Hyperaspinae with form elongate, oblong, dorsoventrally flattened; dorsal surface strongly pubescent. Antenna short, with fusiform club. Intercoxal process of prosternum bicarinate. Epipleuron narrow, flat, not foveate for reception of femoral apices. Leg free, simple, not enlarged or expanded; tarsus cryptotetramerus. Abdomen with 6 visible sterna; basal sternum broad, fused to 2nd sternum medially. Male genitalia with basal lobe asymmetrical. Female genital plate short, transverse.

The genus *Selvadius* had previously been considered a member of the Scymnini because of the obviously pubescent dorsal surface. However, the antenna is typically hyperaspine, and the head is also hyperaspine in that it is broad apically, and partially conceals the antennal insertions. The male and female genitalia do not particularly resemble those of members of either the Hyperaspini or Scymnini. *Selvadius* shows some affinity to the genus *Hyperaspidius* (Hyperaspini), which lacks obvious dorsal pubescence, and also resembles some members of the genus *Diomus* (Scymnini) in the form of the female genital plate, sperm duct and male siphon. I prefer to erect a new tribe for this genus rather than force it into either the Hyperaspini or Scymnini because to do so would, in either case, cause an undesirable expansion of the tribal limits.

Genus *Selvadius* Casey

Selvadius Casey, 1899, p. 137.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 111.—Gordon, 1970a, p. 45.—Gordon, 1976b, p. 8. Type-species; *Selvadius rectus* Casey, by monotypy.

Diagnosis. Length less than 2.50 mm. Color pale yellowish brown to dark reddish brown. Form elongate, oblong, dorsoventrally flattened. Head broad, surface convex, width between eyes about 3 times the width of an eye; eye completely exposed;

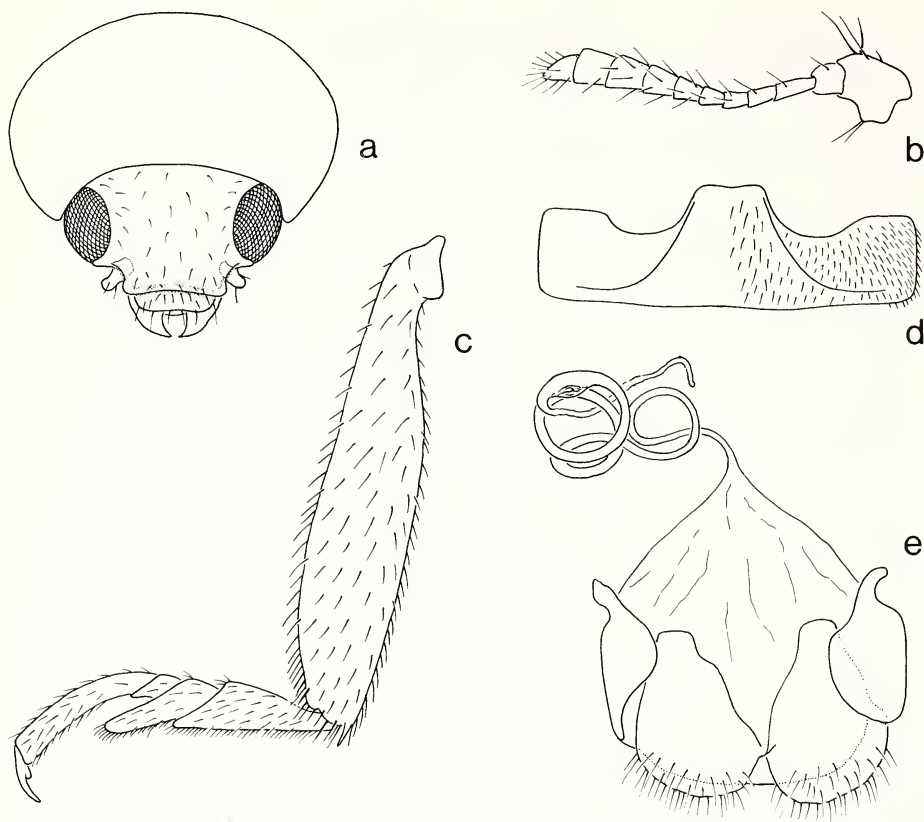


Fig. 287. *Selvadius* sp. a. Head. b. Antenna. c. Hind leg. d. Postcoxal line. e. Female genitalia.

clypeal apex broadly emarginate or nearly truncate, anterolateral angle abrupt, lateral border emarginate at antennal insertion with flange partially covering antennal insertion (Fig. 287a). Antenna 11-segmented (Fig. 287b). Apical segment of maxillary palpus strongly securiform. Pronotum with intercoxal process raised, flat between carinae which extend nearly to apex of prosternum. Tarsal claw with strong median tooth (Fig. 287c). Postcoxal line on first abdominal sternum incomplete, of *Scymnus* type (Fig. 287d). Male genitalia with basal lobe strongly curved in lateral view; paramere broad, strongly narrowed in apical $\frac{1}{3}$; trapes longer than phallobase (Fig. 288); siphon with extremely long, attenuated apical portion (Fig. 290b). Female genitalia without definite spermathecal capsule; sperm duct long, coiled; genital plate transverse, base narrowed, produced (Fig. 287e).

Discussion. *Selvadius* is apparently restricted to North America and is represented there by 4 described species. No information is available on the biology of members of this genus, but they may be similar to members of *Hyperaspidius* in this respect. Species of both genera have been collected in grassland communities, very near the ground, and *Selvadius* must feed on insects (almost certainly scale insects) associated with grasses or herbs of that community. The type series of *S. maderi* was collected



Fig. 288. *Selvadius rectus*.

from oak (*Quercus agrifolia*). Because of the pubescent dorsal surface and incomplete postcoxal lines, species of *Selvadius* are most likely to be confused with species of *Scymnus* (*Scymnus*). The widely separated, completely exposed eyes and partially concealed antennal insertions will distinguish *Selvadius* from members of the Scymnini.

KEY TO SPECIES OF *Selvadius*

- 1. Length less than 1.50 mm 2
- Length 1.60 mm or more 3
- 2(1). Pronotal punctures coarse, nearly contiguous; Arizona, Texas *rectus* Casey
- Pronotal punctures fine, not obvious, separated by the diameter of a puncture or more; California *maderi* (Nunenmacher)
- 3(1). Length 1.60 to 2.0 mm; Colorado, Wyoming *nunenmacheri* Gordon
- Length 2.0 to 2.25 mm; Arizona, California, New Mexico *megacephalus* (Fall)

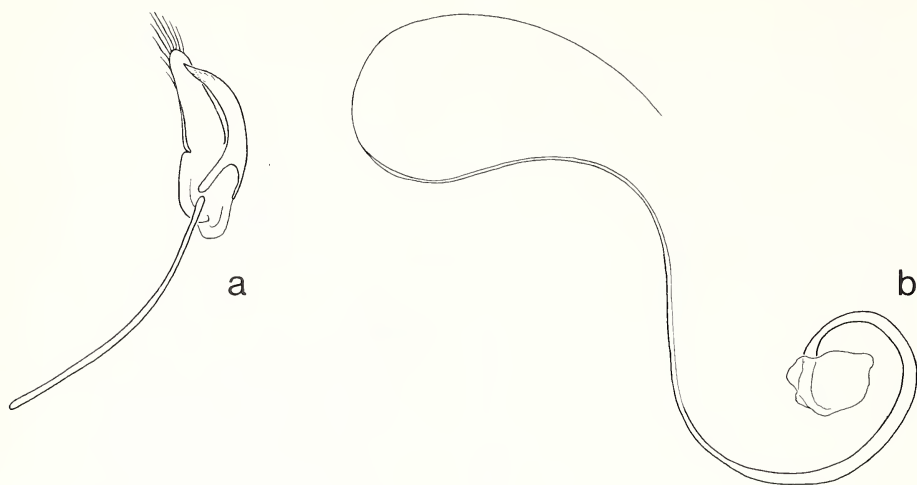


Fig. 289. *Selvadius maderi*.

Selvadius rectus Casey
Fig. 288; Map, Fig. 293

Selvadius rectus Casey, 1899, p. 138.—Korschefsky, 1931, p. 111.—Gordon, 1970a, p. 45.

Diagnosis. Length 1.40 mm, width 0.80 mm. Form elongate, not exactly parallel sided, widest at middle of elytron. Postcoxal line short, widely incomplete. Male genitalia as in Figure 288.

Discussion. This species resembles *S. maderi* in the small size and overall appearance. The only external difference that I have been able to detect is the size and density of the pronotal punctures which are much coarser and closer together in *S. rectus* than in *S. maderi*. However, I've seen only the type and 2 additional specimens of *S. rectus*, so this character may not be constant. The type is a unique (holotype) male in the Casey collection.

Type locality. Tucson, Arizona.

Type depository. USNM (35250).

Distribution. Figure 293. ARIZONA: Tucson. CALIFORNIA: Inyo Co., Eureka Valley. TEXAS: El Paso.

Selvadius maderi (Nunenmacher), new combination
Fig. 289a, b; Map, Fig. 293

Scymnus maderi Nunenmacher, 1937, p. 183.

Scymnus quercus Nunenmacher, 1934, p. 18 (not *Scymnus quercus* Mulsant, 1850).

Diagnosis. Length 1.20 to 1.40 mm, width 0.75 to 0.90 mm. Similar to *S. rectus* in all respects except pronotal punctures finer, less dense. Male genitalia as in Figure 289a, b.

Discussion. A male cotype is here designated as the lectotype, and 3 other type

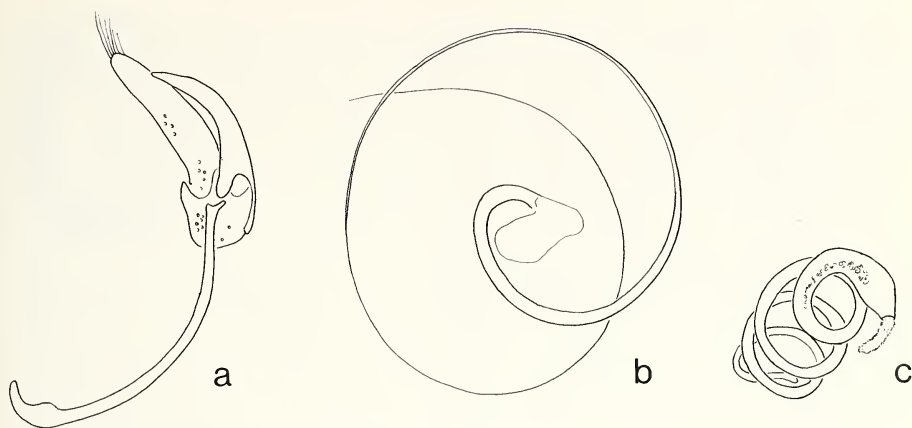


Fig. 290. *Selvadius nunenmacheri*.

specimens designated as paralectotypes. I previously examined the types of this species, and realized that it belonged to *Selvadius*, but I neglected to formally transfer it although it was not included in the *Scymnus* revision (Gordon, 1976b).

Type locality. Vine Hill, Contra Costa Co., California (lectotype here designated).

Type depository. CAS.

Distribution. Figure 293. CALIFORNIA: type locality.

Selvadius nunenmacheri Gordon

Fig. 290a–c; Map, Fig. 293

Selvadius nunenmacheri Gordon, 1970a, p. 45.

Diagnosis. Length 1.55 to 2.35 mm, width 1.0 to 1.35 mm. Form varies from parallel sided to slightly oval. Male genitalia as in Figure 290a, b. Female genitalia as in Figure 290c.

Discussion. I regard the specimens recorded here as composing a single polymorphic species. There is noticeable variation in size and some variation in the form of the postcoxal line and body shape. The male genitalia, however, are constant throughout and I cannot find a pattern in the observed variation. There are wide gaps in the known distribution of *S. nunenmacheri*, and I expect that specimens from appropriate localities will confirm the integrity of this species.

Type locality. Colorado Springs, Colorado.

Type depository. USNM (70401).

Distribution. Figure 293. COLORADO: Colorado Springs; Nunn, Pawnee Grassland. WYOMING: Cheyenne; Tipton.

Selvadius megacephalus (Fall)

Fig. 291a–c; Map, Fig. 293

Scymnus megacephalus Fall, 1901, p. 233.—Korschefsky, 1931, p. 162.

Selvadius megacephalus: Gordon, 1970a, p. 45.

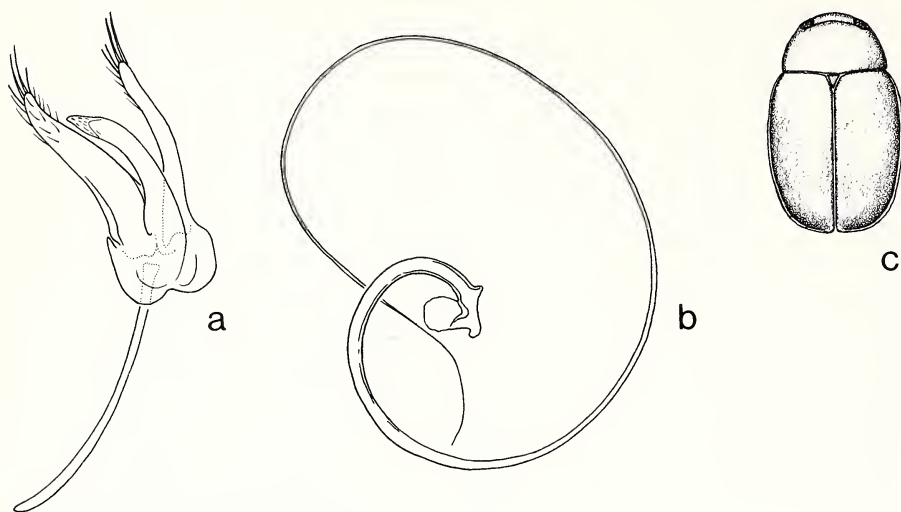


Fig. 291. *Selvadius megacephalus*.

Diagnosis. Length 2.0 to 2.25 mm, width 1.60 to 1.70 mm. Form parallel sided to slightly oval (Fig. 291c). Dorsal surface reddish brown except narrow sutural margin dark brown. Male genitalia as in Figure 291a, b.

Discussion. The type locality is Pasadena, California, and I have seen one additional California specimen. Examples from Arizona and New Mexico appear to match the type exactly; therefore, I refer them to this species. No solid external differences are apparent that will separate *S. megacephalus* and *S. nunenmacheri* except size, and there is a slight overlap even there. However, the male genitalia are noticeably different, and I regard both species as valid. The type specimen is a unique (holotype) female in the Fall collection.

Type locality. Pasadena, California.

Type depository. MCZ.

Distribution. Figure 293. ARIZONA: Santa Catalina Mts.; Santa Cruz Co., Mowry; Tucson. CALIFORNIA: Cathedral City; Pasadena. NEW MEXICO: Hot Springs.

Tribe Hyperaspini

Hyperaspini Costa, 1849, pp. 9, 64.—Casey, 1899, p. 115.—Blatchley, 1910, p. 519.—Korschefsky, 1932, p. 176.—Chapin, 1966, p. 278.—J. Chapin, 1974, p. 38.—Belicek, 1976, p. 294.

Hyperaspidini, Wingo, 1952, p. 17.

Hyperaspiens Mulsant, 1850, p. 2.

Hyperaspidae Berg, 1874, p. 291.

Hyperaspides Crotch, 1873, p. 377.—Crotch, 1874b, p. 208.—Gorham, 1894, p. 183.

Hyperaspites Chapuis, 1876, p. 166.

Hyperaspidina Jacobson, 1916, p. 969.

Scymninae of small to medium size, 1.50 to 5.0 mm in length; form ranges from elongate oval, depressed, to rounded, convex. Dorsal surface glabrous except in

Blaisdelliana. Antenna short, 9 to 11-segmented; club elongate, fusiform, apical segment small, recessed in preceding segment. Eye large, entire or weakly notched, finely faceted, without pubescence. Maxillary palpus with apical segment securiform. Scutellum usually large. Epipleuron of elytron narrow, usually flat, usually excavated for reception of femoral apex except *Hyperaspidius* and *Blaisdelliana*. Leg short; femur grooved for reception of tibia; tarsus cryptotetramerous. Abdomen with 6 visible sterna in female, 7 sterna visible in male. Male genitalia asymmetrical. Female coxal plate usually short, transverse, stylus reduced or absent.

I recognize 6 genera in America north of Mexico as belonging to this tribe. Five of these have traditionally been placed here, and I now transfer *Blaisdelliana* Gordon from the Scymnini to the Hyperaspini. Chapin (1966) was the first to critically study the genera of Western Hemisphere Hyperaspini using internal characters as well as external characters, and he succeeded in creating order from the chaos that previously existed. El-Ali (unpubl. dissertation) further refined Chapin's preliminary work to provide a solid generic classification.

KEY TO GENERA OF HYPERASPINI

1. Dorsal surface strongly pubescent *Blaisdelliana* Gordon
- Dorsal surface glabrous 2
- 2(1). Anterior tibia with external tooth or spine (Fig. 458c) *Brachiacantha* Chevrolat
- Anterior tibia without external tooth or spine 3
- 3(2). Epipleuron of elytron not excavated for reception of middle and hind femoral apices (Fig. 295b) *Hyperaspidius* Crotch
- Epipleuron of elytron excavated for reception of middle and hind femora apices (Fig. 333d) 4
- 4(3). Epipleuron of elytron strongly descending externally; anterior tibia wide, angulate or rounded anteriorly at external margin (Fig. 330b); elytron greenish black with red spot behind middle *Thalassa* Mulsant
- Epipleuron of elytron flat or feebly inclined; anterior tibia slender or enlarged apically; elytron not greenish black 5
- 5(4). Femur short, stout; tibia enlarged apically (Fig. 327b); elytron reddish brown, without maculation (Fig. 328e); rare *Helesius* Casey
- Femur slender; tibia slender, not enlarged apically (Fig. 333f); elytron usually black or brown with pale maculation, rarely immaculate *Hyperaspis* Redtenbacher

Genus *Blaisdelliana* Gordon

Blaisdelliana Gordon, 1970a, p. 43. Type-species; *Hyperaspis sexualis* Casey, by monotypy.

Hyperaspini with form broad, somewhat elongate, appearing almost rectangular; length less than 2.0 mm; entire dorsal surface pubescent. Head elongate, inclined downward. Antenna 10-segmented (Fig. 292b); antennal insertion exposed. Eye entire, small, widely separated. Clypeus nearly parallel sided, apex emarginate (Fig. 292a). Lateral margin of pronotum rounded. Epipleuron of elytron narrow, flat, not excavated for reception of middle or hind femoral apices. Prosternum with 2 faint carinae extending nearly to apex. Posterior margin of metasternum nearly on equal plane with abdomen between coxa and lateral margin. Leg long, slender; anterior tibia simple; tarsal claw without basal tooth. Postcoxal line on first abdominal ster-

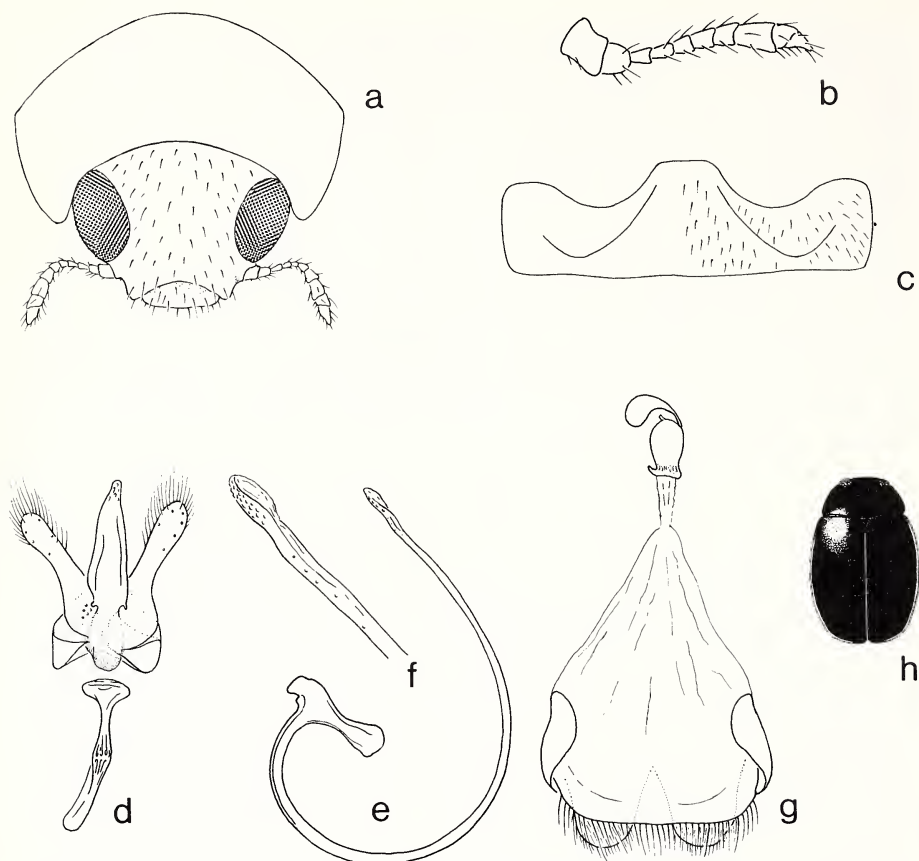


Fig. 292. *Blaisdelliana sexualis*. a. Head. b. Antenna. c. Postcoxal lines. d-g. Male genitalia. h. Habitus.

num incomplete, of *Scymnus* type (Fig. 292c). Apical abdominal sternum of male truncate. Male genitalia with basal lobe slightly asymmetrical, paramere rooted in phallobase (Fig. 292d). Female genitalia with compound spermatheca, basal portion without appendix, coxal plate transverse (Fig. 292g).

Blaisdelliana is known only from the southwestern United States, and I recognize only one species in the genus. Casey (1899) correctly placed *sexualis* in the Hyperaspini, Dobzhansky (1941) transferred it to the Scymnini, and Gordon (1970a) erected the genus *Blaisdelliana* for it but retained it in the Scymnini. Present examination of the female genitalia and antennae of this species has resulted in a reevaluation of its position and I now consider it to belong in the Hyperaspini. The only morphological characteristic (albeit a most obvious one) that has caused *B. sexualis* to be considered a scymnine is the presence of dorsal pubescence. In all other respects it is a hyperaspine. *Blaisdelliana* is most similar to *Hyperaspidium* but the dorsal pubescence and produced anterolateral clypeal angles of *Blaisdelliana* will distinguish that genus. No host data are available.

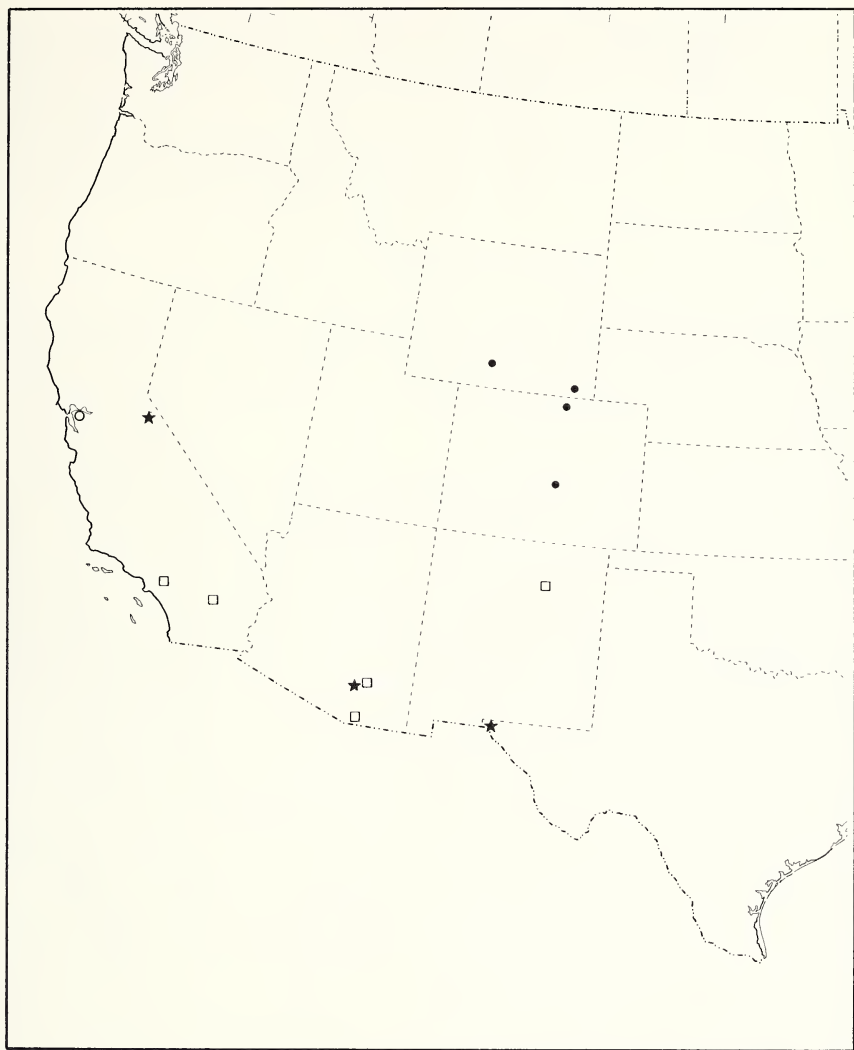


Fig. 293. Distribution. *Selvadius rectus* (star); *S. maderi* (open circle); *S. nunenmacheri* (dot); *S. megacephalus* (square).

Blaisdelliana sexualis (Casey)

Fig. 292a-h; Map, Fig. 294

Hyperaspis sexualis Casey, 1924, p. 167.—Korschefsky, 1931, p. 196.

Scymnus sexualis: Dobzhansky, 1941, p. 86.

Blaisdelliana vanduzeei Gordon, 1970a, p. 43.

Blaisdelliana sexualis: Gordon, 1974c, p. 209.

Diagnosis. Length 1.25 to 1.78 mm, width 0.84 to 1.25 mm. Dorsal surface black



Fig. 294. Distribution. *Blaisdelliana sexualis*.

to brown (Fig. 292h); antenna, mouthparts, femoral apices and remainder of leg yellow; male with clypeus and frons yellow (in California specimens narrow lateral border of pronotum yellow). Male genitalia as in Figure 292d–f. Female genitalia as in Figure 292g.

Discussion. The specimens from California are a little larger than those from Utah, and the male has a yellow pronotal margin. The basal lobes of the male genitalia are noticeably different when males from St. George, Utah, were compared with a male from Fresno, California, but a male from Yuma, Arizona, exhibits an intermediate

form. I consider all specimens examined as conspecific on the premise that additional material from intermediate localities will provide intergrading specimens.

Type locality. St. George, Utah (lectotype and paralectotypes previously designated by Gordon (1974c).

Type depository. USNM (35158).

Distribution. Figure 294. ARIZONA: Yuma. CALIFORNIA: Fresno Co.; Indio; Kings Co.; Rosamond. UTAH: St. George.

Genus *Hyperaspidius* Crotch

Hyperaspidius Crotch, 1873, p. 382.—Casey, 1899, p. 130.—Leng, 1920, p. 212.—Casey, 1924, p. 168.—Korschefsky, 1931, p. 199.—Wingo, 1952, p. 26.—Hatch, 1961, p. 155.—Chapin, 1966, p. 280.—Belicek, 1976, p. 308. Type-species; *Hyperaspis vittigera* LeConte (not *Chrysomela trimaculatus* L., 1767, of authors), by original designation.

Hyperaspini with body usually elongate, subparallel to parallel sided, dorsoventrally compressed; dorsal surface glabrous. Head usually yellow in male, brown or black in female. Antenna 10-segmented (Fig. 295a); antennal insertion exposed. Eye entire. Scutellum small, wider than long. Epipleuron of elytron narrow, not descending externally, not grooved medially, not excavated for reception of middle and hind femoral apices (Fig. 295b). Prosternum with 2 carinae convergent anteriorly. Posterior margin of metasternum nearly on equal plane with abdomen between coxa and lateral margin. Leg with femur and tibia slightly compressed; anterior tibia simple; tarsal claw without basal tooth. Postcoxal line on first abdominal sternum nearly complete, similar to *Pullus* type, or incomplete, of *Scymnus* type. Apical abdominal sternum in male feebly to strongly emarginate. Male genitalia with basal lobe asymmetrical, paramere rooted in phallobase, of 3 distinct types (Figs. 295c, 298a, 309a). Female genitalia with compound spermatheca, basal portion with appendix (Fig. 296d), coxal plate always transverse.

The lack of epipleural depressions and simple tarsal claws will separate *Hyperaspidius* from other hyperaspine genera. *Hyperaspidius* is a New World genus containing 26 species, none of which are known to occur south of Mexico. Crotch (1873) designated *Chrysomela trimaculata* L. as the type species, however, the specimens Crotch identified as *trimaculata* were North American specimens described as *Hyperaspis vittigera* by LeConte (1852). Since *Chrysomela trimaculata* L. is supposedly a tropical American species, Crotch apparently misidentified the *vittigera* of LeConte, therefore I recognize *H. vittigera* LeConte as the type-species of *Hyperaspidius* because LeConte's type was among other specimens actually seen by Crotch when he made his type species designation. The type of *Chrysomela trimaculata* (L.) is missing from the Linnean collection in London, therefore the exact identity of that species may never be determined.

Host records for *Hyperaspidius* species are almost nonexistent. I have seen 2 females from Phoenix, Arizona, labeled "on cottony cochineal scale of cactus." El-Ali (unpubl. dissertation) stated that specimens of *H. comparatus* Casey were collected feeding on distichlis mealybug, *Distichlicoccus salinus* (Cockerell)?, and that they were reared in the laboratory on the solanum mealybug, *Phenacoccus solani* Ferris. One species

has been recorded in the literature as feeding on *Dactylopius confusus* (Cockerell) in Texas, and "*H. vittigerus*" was recorded on *Antonina graminis* (Maskell). Some species of *Hyperaspidius* are prevalent in grasslands, others are known only from sand dune areas. As a group they are rather uncommonly collected, perhaps because they usually occur close to the ground where normal net sweeping will not reach them. Pit traps are an effective method of collecting as evidenced by several large series of specimens examined in the course of this study. *Hyperaspidius* is one of the North American genera that needs to be studied further. I am not satisfied with many of the conclusions reached herein, and biosystematic research will be needed as well as the collection of many more specimens from critical areas in order to accurately reflect the actual taxonomic picture.

Hyperaspidius was last treated in its entirety by Casey (1899). Since then, various authors have published individual descriptions, and regional papers by Wingo (1952), Hatch (1961), and Belicek (1976) have each included a few species.

The genus can be divided into 3 groups based on the form of the median lobe of the male genitalia. I designate these as the *comparatus*, *arcuatus*, and *vittigerus* groups. Morphological distinctions are discussed under each group heading.

KEY TO SPECIES OF *Hyperaspidius*

1. Elytron vittate, always with yellow discal vitta which may be incomplete, and a yellow vitta on lateral margin (Figs. 371d, 318d) 14
- Elytron not appearing vittate, discal vitta absent, lateral margin vittate or not 2
- 2(1). Species occurring east of Mississippi River 3
- Species occurring west of Mississippi River 9
- 3(2). Elytron black with 4 yellow spots (Fig. 313) *venustulus* (Mulsant)
- Elytron never with 4 yellow spots as figured above 4
- 4(3). Elytron entirely yellow, immaculate (Fig. 298e) *transfugatus* Casey
- Elytron yellow with dark maculation, or dark with yellow lateral border 5
- 5(4). Elytron yellow with dark maculation, humerus usually with small, elongate brown spot (Fig. 299e) *militaris* (LeConte)
- Elytron dark brown or black, with or without yellow lateral border 6
- 6(5). Elytron with complete yellow lateral border (Fig. 312d) *marginatus* (Gaines)
- Elytron entirely brown or black, or dark with incomplete yellow border in humeral area 7
- 7(6). Species known from Massachusetts (Fig. 310e) *blatchleyi*, n. name
- Species known from North Carolina to Florida 8
- 8(7). Male pronotum reddish yellow except basal 1/3 with obscure, brown maculation; female unknown; Florida *flavocephalus* Blatchley
- Male pronotum mostly brown or black; female pronotum dark brown or black except anterior angle pale; North Carolina, Georgia *nubilatus* Casey
- 9(2). Elytron entirely yellow, immaculate (Fig. 308d) *nanellus*, n. sp.
- Elytron brown or black, usually maculate 10
- 10(9). Elytron dark, with basal and lateral borders yellow (Fig. 303d) .. *arcuatus* (LeConte)
- Elytron not as described above 11
- 11(10). Pronotum entirely pale, yellow with reddish yellow maculation; elytron with discal spot in apical 1/2 (Fig. 315c) *insignis* Casey
- Pronotum mostly brown or black; elytron without discal spot 12
- 12(11). Elytron brown or black with complete yellow vitta on lateral margin (Fig. 312d); Texas *marginatus* (Gaines)

- Elytron brown or black, if yellow lateral vitta present, then vitta interrupted in apical $\frac{1}{4}$ with apical spot present; not occurring in Texas 13
- 13(12). Elytron brown or black with yellow lateral vitta interrupted in apical $\frac{1}{4}$ with apical spot present (Fig. 300d) *tristis* (LeConte)
- Elytron entirely brown or black, sometimes with faint maculation apparent on humeral angle and/or disc (Fig. 302d) *ploribundus* (Nunenmacher)
- 14(1). Species occurring east of the 100th meridian, north of Texas (Fig. 317d) *wolcottii* (Nunenmacher)
- Species occurring west of the 100th meridian, or if east of the 100th meridian, then only in Texas 15
- 15(14). Prosternum coarsely punctured, anterior margin nearly always broadly, feebly emarginate 16
- Prosternum impunctate or with fine, indistinct punctures, anterior margin truncate 24
- 16(15). Female with 6th abdominal sternum abruptly narrowed to rounded apex; male with 6th abdominal sternum strongly narrowed toward apex, apex strongly emarginate; body form extremely elongate, tapered toward apex (Fig. 325d); Coral Pink Sand Dunes, Utah *andrewsi*, n. sp.
- Female with 6th abdominal sternum gently narrowed to broadly rounded apex; male with 6th abdominal sternum feebly narrowed toward apex, apex weakly emarginate; not known from Coral Pink Sand Dunes 17
- 17(16). Species occurring in Texas 18
- Species not occurring in Texas 19
- 18(17). Body elongate, parallel sided; dorsal maculation light brown, indistinct (Fig. 321d) *shauli* Nunenmacher
- Body broad, sides not appearing strongly parallel sided; dorsal maculation dark brown or black (Fig. 318d) *oblongus* Casey
- 19(17). Pronotum yellow to reddish yellow, often yellow with indistinct reddish yellow maculation 20
- Pronotum mostly yellow or mostly black, if mostly yellow, then with some dark brown or black maculation 21
- 20(19). Surface of pronotum dull, alutaceous; Colorado and Alberta *insignis* Casey
- Surface of pronotum shiny, polished; Algodones Dunes, Imperial Co., California (Fig. 316d) *algodonus*, n. sp.
- 21(19). Female postcoxal line complete (*Pullus* type); area within postcoxal line of both sexes smooth, polished, punctures scattered; inland sand dunes, southern California *hardyi*, n. sp.
- Female postcoxal line incomplete (*Scymnus* type); area within postcoxal line of both sexes dull, alutaceous, punctation often dense, usually coarse; not occurring in southern California 22
- 22(21). Species known only from southern New Mexico; postcoxal line in both sexes equally incomplete *ingenitus* Casey
- Species not known from New Mexico; postcoxal line nearly complete in male, incomplete in female 23
- 23(22). Length less than 2.10 mm; female first abdominal sternum with punctures very fine, female postcoxal line widely incomplete (Fig. 322e) *vittigerus* (LeConte)
- Length more than 2.10 mm; female first abdominal sternum with punctures coarse, dense, female postcoxal line narrowly incomplete (Fig. 323d) *hercules* Belicek
- 24(15). Head of male dark brown with irregular yellow area adjacent to eye; male pronotum dark brown on anterior margin *tristis* (LeConte)

- Head of male always yellow except vertex usually brown or black; male pronotum yellow on anterior margin (except *arcuatus*) 25
- 25(24). Basal lobe of male genitalia slender, without lateral projection in basal $\frac{1}{3}$ (Fig. 295c) 26
- Basal lobe of male genitalia broad, with lateral projection in basal $\frac{1}{3}$ (Fig. 304a) 27
- 26(25). Basal lobe of male genitalia longer than paramere (Fig. 295c) *comparatus* Casey
- Basal lobe of male genitalia shorter than paramere (Fig. 296a) *mimus* Casey
- 27(25). Basal lobe of male genitalia with lateral projection in basal $\frac{1}{3}$ pronounced, abruptly rounded (Fig. 304a) *simulatus*, n. sp.
- Basal lobe of male genitalia with lateral projection in apical $\frac{1}{3}$ feeble, slightly angulate or feebly rounded 28
- 28(27). Basal lobe of male genitalia triangular in apical $\frac{2}{3}$ (Fig. 306a) *bryanti* Nunenmacher
- Basal lobe of male genitalia not triangular in apical $\frac{2}{3}$ 29
- 29(28). Basal lobe of male genitalia with lateral projection in apical $\frac{1}{3}$ feebly rounded (Fig. 305a); Arizona *pallescent* Casey
- Basal lobe of male genitalia with lateral projection in apical $\frac{1}{3}$ slightly angulate (Fig. 303a); not known from Arizona *arcuatus* (LeConte)

comparatus group

Prosternum impunctate; male genitalia with basal lobe as long as, or longer than paramere, slender, lacking lateral projection in basal $\frac{1}{3}$ (Fig. 295c).

Hyperaspidius comparatus Casey

Fig. 295a-h; Map, Fig. 287

Hyperaspidius comparatus Casey, 1899, p. 130. — Leng, 1920, p. 212. — Korschefsky, 1931, p. 199.

Hyperaspidius juniperus Nunenmacher, 1944, p. 145. **New Synonymy.**

Diagnosis. Length 1.40 to 2.10 mm; width 1.0 to 1.50 mm. Form oblong, lateral margin of elytron feebly curved. Pronotum of male yellow with indistinct yellowish brown maculation in basal $\frac{1}{3}$, or dark brown with anterior and lateral margins narrowly yellow; pronotum of female yellowish brown with lateral margin narrowly yellow. Elytron with 2 broad, yellow vittae often connected at apex (Fig. 295f-h), northern specimens with vittae narrow, widely disconnected at apex. Postcoxal line complete (male) or narrowly incomplete (female), area within line alutaceous, punctation barely perceptible. Male genitalia as in Figure 295c-d.

Discussion. The male genitalia are the only certain criteria I can find that allow *H. comparatus* to be recognized. The color patterns present in this species are also found in several other species such as *H. mimus* and *H. pallescens*. I have included specimens from New Mexico here because the genitalia appear to be identical with those of California specimens. Since no specimens of *H. comparatus* have been seen from Arizona, it is possible that we are dealing with 2 species. The holotype of *H. juniperus* Nunenmacher is a typical example of *H. comparatus*, therefore I regard *H. juniperus* as a junior synonym of *H. comparatus*. The type of *H. comparatus* is a unique female (holotype).

Type locality. Of *comparatus*, Alameda Co., California; of *juniperus*, Tehachapi Pass, Kern Co., California.

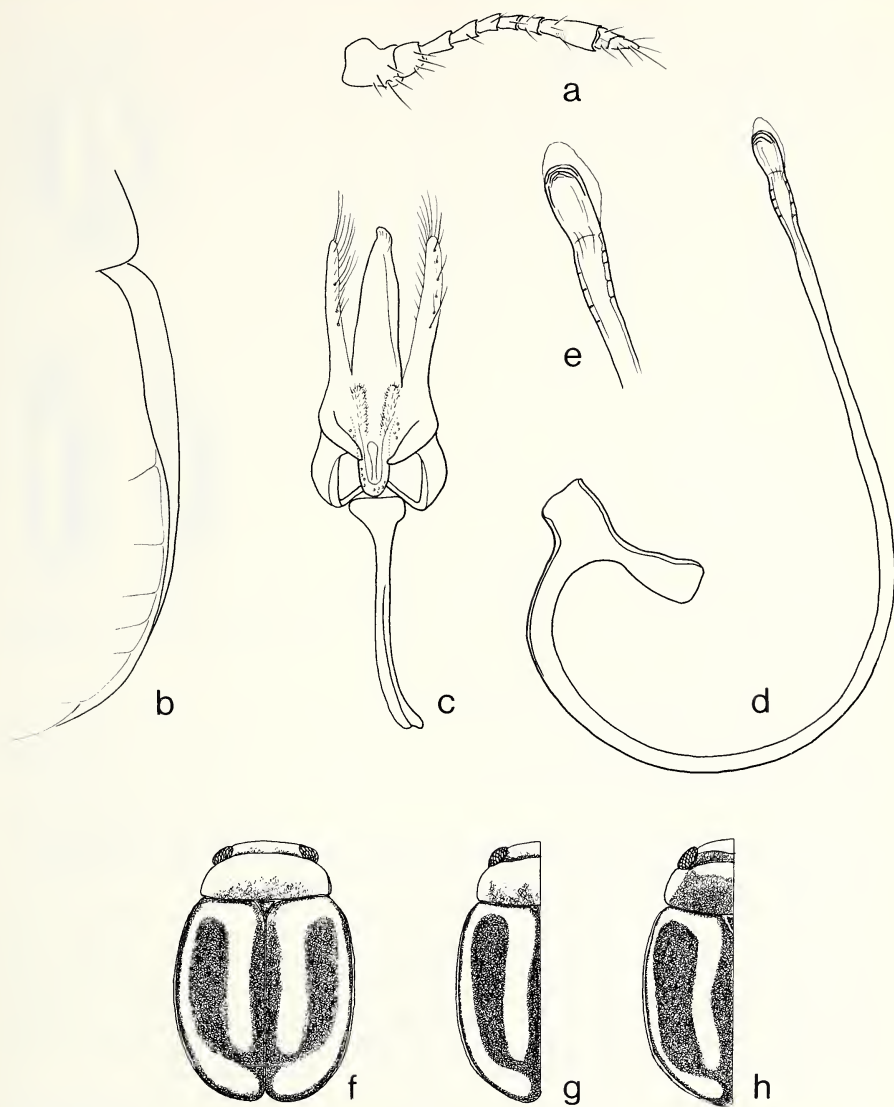


Fig. 295. *Hyperaspidius* sp. a. Antenna. b. Epipleuron. c-h. *Hyperaspidius comparatus*.

Type depository. Of *comparatus*, USNM (35215); of *juniperus*, CAS.

Distribution. Figure 287. BRITISH COLUMBIA: Radium. CALIFORNIA: Alameda Co.; Contra Costa Co., Pt. Molet Beach; Fresno Co., Fresno; Inyo Co., Owens Lake; Kern Co., Bakersfield, Tehachapi Pass; Kings Co.; Lassen Co., Spaulding; Los Angeles Co., Lancaster, Pasadena; Orange Co., Cypress; Paraiso Hot Springs; Riverside Co., Temecula; Santa Barbara Co., county record, San Miguel Island. NEW MEXICO: Bernallilo Co., Albuquerque; San Miguel Co., Las Vegas; Quay Co., Tuc-

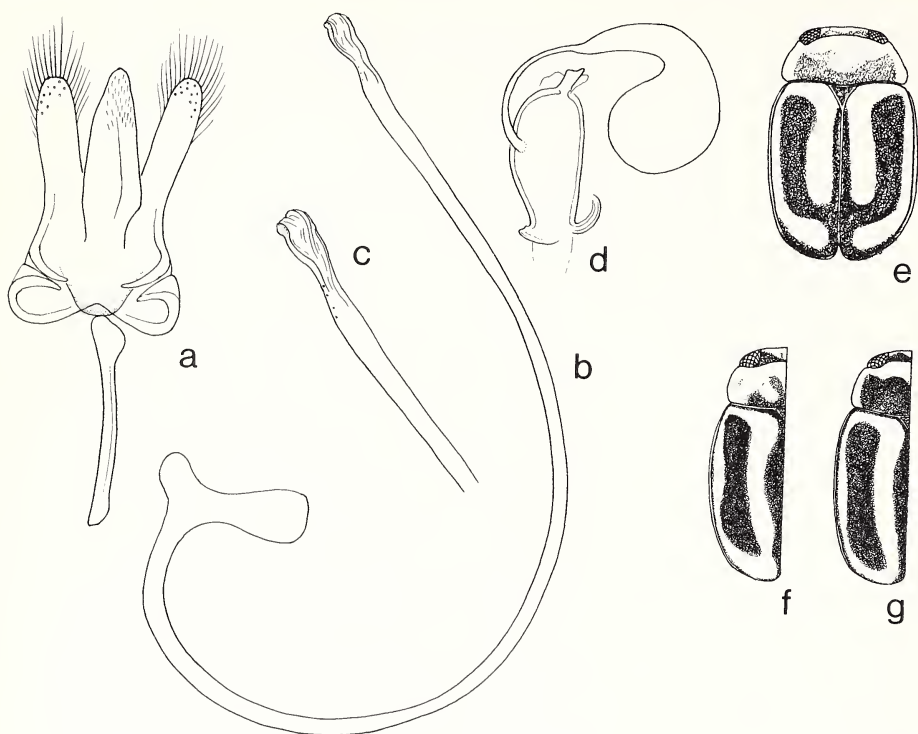


Fig. 296. *Hyperaspidium mimus*.

umcari. UTAH: Iron Co., Buckskin Valley; Tooele Co., Skull Valley. WASHINGTON: Benton Co., Rattlesnake Ridge; Doris.

Hyperaspidium mimus Casey
Fig. 296a-g; Map, Fig. 297

Hyperaspidium mimus Casey, 1924, p. 169.—Korschevsky, 1931, p. 199.

Hyperaspidium carri Nunenmacher, 1948, p. 6. **New Synonymy.**

Hyperaspidium coloradensis Nunenmacher, 1948, p. 7. **New Synonymy.**

Diagnosis. Length 1.40 to 1.80 mm; width 1.0 to 1.20 mm. Description as for *H. comparatus* (Fig. 296e-g) except female pronotum sometimes with narrow, yellow anterior margin. Male genitalia with basal lobe not longer than paramere (Fig. 296a-c). Female genitalia as in Figure 296d.

Discussion. This species is very similar to *H. comparatus*, but has the basal lobe of the male genitalia no longer than the paramere. Based on the specimens examined, it can be said that the distributions of *H. comparatus* and *H. mimus* do not overlap, or only narrowly so; but collections from additional localities may eliminate this distinction. *Hyperaspidium carri* Nunenmacher and *H. coloradensis* Nunenmacher

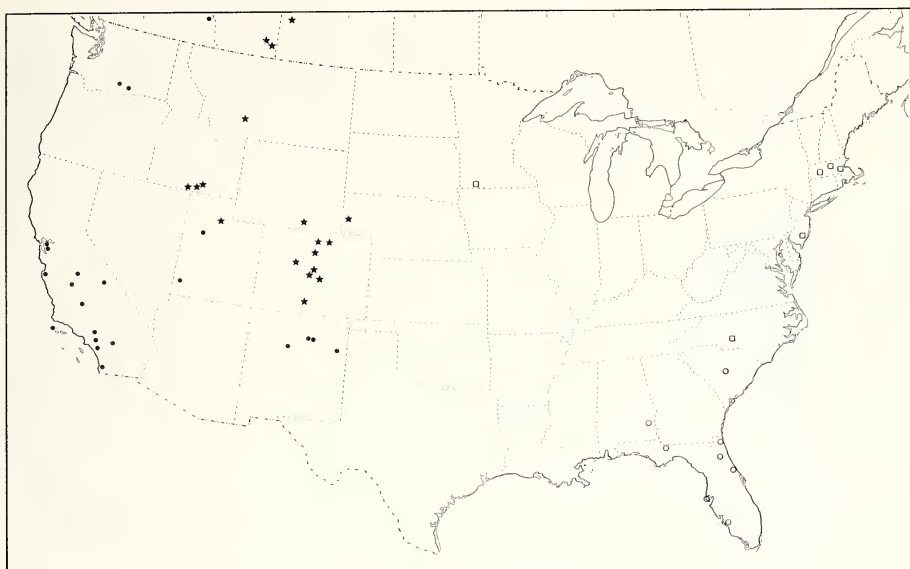


Fig. 297. Distribution. *Hyperaspidius comparatus* (dot); *H. mimus* (star); *H. transfugatus* (square); *H. militaris* (open circle).

are apparently identical in all respects to *H. mimus*, therefore I regard them as junior synonyms.

Type locality. Of *mimus*, Boulder Co., Colorado; of *carri*, Medicine Hat, Alberta; of *coloradensis*, Colorado.

Type depository. Of *mimus*, USNM (35217); of *carri* and *coloradensis*, CAS.

Distribution. Figure 297. ALBERTA: Cypress Hills, Medicine Hat. SASKATCHEWAN: Swift Current. COLORADO: Boulder Co.; Douglas Co., Sedalia; El Paso Co., Colorado Springs; Huerfano Co., La Veta; Lake Co., Leadville; Larimer Co., Fort Collins; Teller Co., Florissant; Weld Co., Pawnee National Grassland. IDAHO: Cassia Co., Burley; Twin Falls Co., Hansen, Murtaugh. MONTANA: Lewis and Clark Co., Helena. NEBRASKA: Scotts Bluff Co., Scottsbluff. UTAH: Salt Lake Co., Salt Lake. WYOMING: Carbon Co., Medicine Bow.

arcuatus group

Prosternum impunctate or minutely punctured; male genitalia with basal lobe not longer than paramere, with feeble lateral projection in basal $\frac{1}{3}$ (Fig. 298a).

Hyperaspidius transfugatus Casey

Fig. 298a-e; Map, Fig. 297

Hyperaspidius transfugatus Casey, 1899, p. 131.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 200.—Wingo, 1952, p. 26.

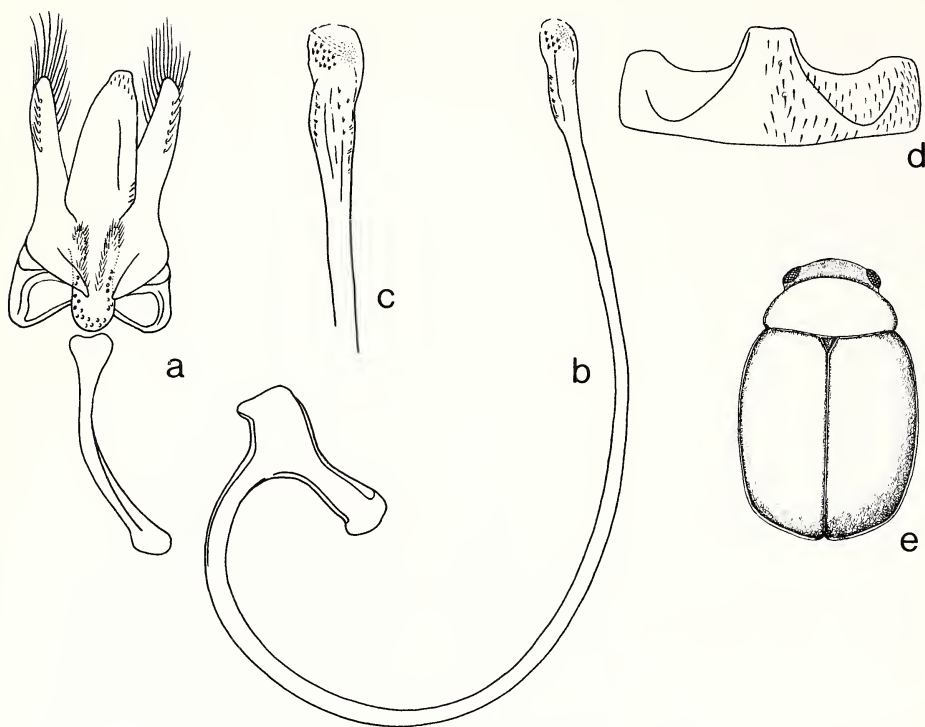


Fig. 298. *Hyperaspis transfugatus*.

Hyperaspidium pallidus Casey, 1924, p. 169.—Korschefsky, 1931, p. 200. **New Synonymy.**

Hyperaspidium horni Nunenmacher, 1934a, p. 19. **New Synonymy.**

Diagnosis. Length 1.90 to 2.10 mm, width 1.30 to 1.45 mm. Form oblong, lateral margin of elytron feebly curved. Pronotum entirely yellowish brown. Elytron yellow except sutural margin narrowly darkened (Fig. 298e). Postcoxal line narrowly incomplete (male), or widely incomplete (female) (Fig. 298d), area within line alutaceous, punctation barely perceptible. Male genitalia as in Figure 298a–c.

Discussion. The pale dorsal color and eastern distribution combined make this an easily recognized species. *Hyperaspidium pallidus* Casey and *H. horni* Nunenmacher are junior synonyms of *H. transfugatus*. The types of both *H. transfugatus* and *H. pallidus* are unique females (holotypes). I have seen one “cotype” of *H. horni* labeled “Buena NJ/Coll. by C. Liebeck/*Hyperaspidium horni* Nun. Type” which I here designate and label the lectotype.

Type locality. Of *transfugatus*, Mt. Tom, Massachusetts; of *pallidus*, Southern Pines, North Carolina; of *horni*, Buena, New Jersey (lectotype here designated).

Type depository. Of *transfugatus* (35221) and *pallidus* (35223), USNM; of *horni*, CAS.

Distribution. Figure 287. MASSACHUSETTS: Plymouth Co., Marion; Worcester

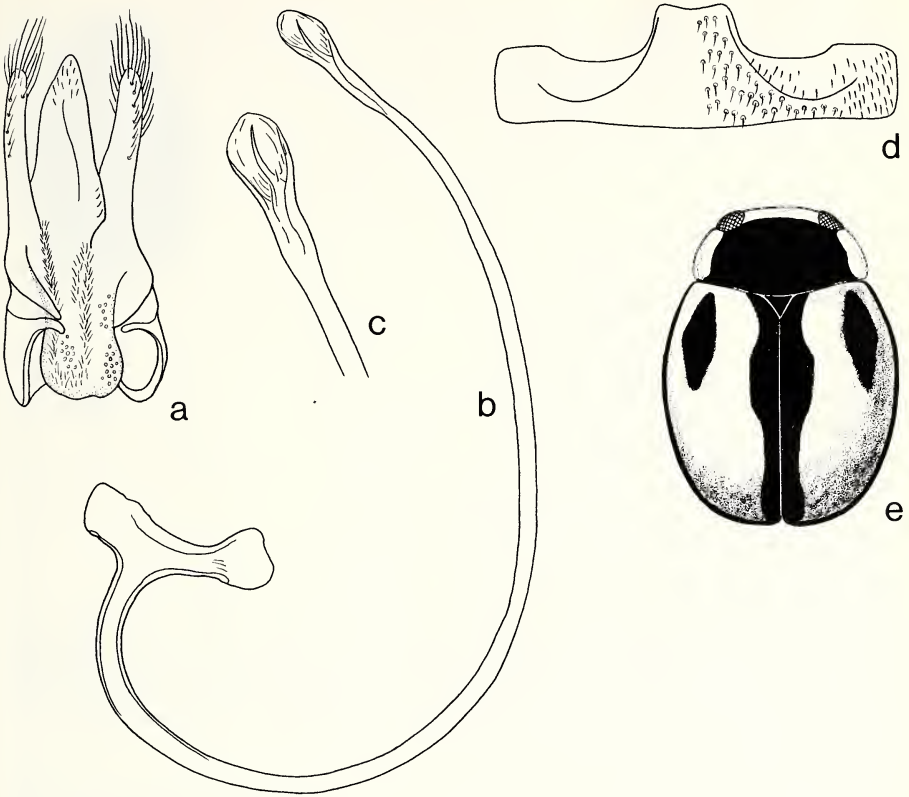


Fig. 299. *Hyperaspis militaris*.

Co., Berlin. MINNESOTA: Jackson Co. NEW JERSEY: Atlantic Co., Buena. NORTH CAROLINA: Moore Co., Southern Pines.

Hyperaspidium militaris (LeConte)

Fig. 299a-c; Map, Fig. 297

Hyperaspis militaris LeConte, 1852, p. 133.—Crotch, 1874b, p. 231.

Hyperaspidium militaris: Crotch, 1873, p. 382.—Schwarz, 1878, p. 448.—Casey, 1899, p. 131.—Blatchley, 1917, p. 140.—Korschefsky, 1931, p. 199.

Diagnosis. Length 1.90 to 2.50 mm, width 1.50 to 1.80 mm. Form oblong, lateral margin of elytron feebly curved. Pronotum of male yellow with obscure brownish yellow maculation in basal $\frac{1}{2}$; pronotum of female black with lateral border narrowly yellow. Elytron yellow except broad sutural border brown or black, short vitta present on humerus (Fig. 299e). Postcoxal line widely incomplete in both sexes (Fig. 299d), area within line alutaceous, punctation barely perceptible. Male genitalia as in Figure 299a-c.

Discussion. No known species of *Hyperaspidium* has the elytral pattern of *H. mil-*

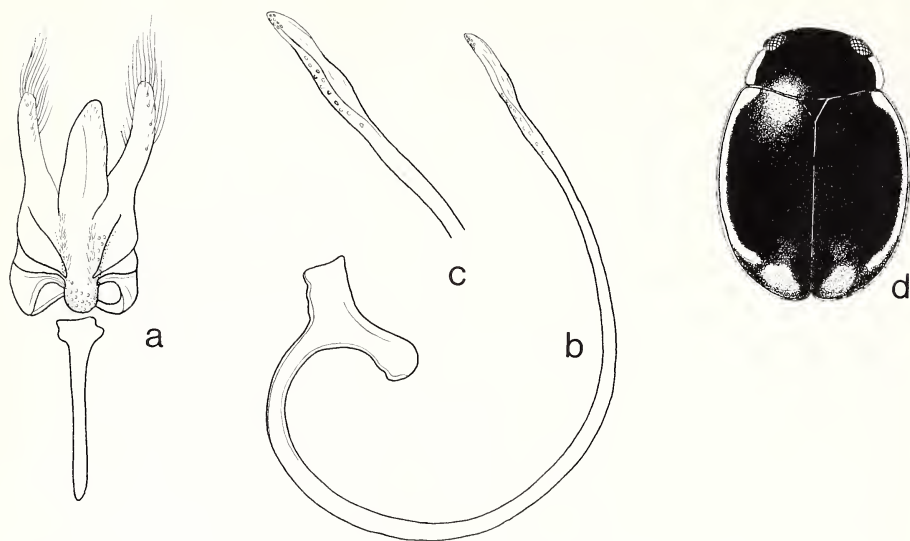


Fig. 300. *Hyperaspidius tristis*.

itaris. The only other species that may occur in the southeastern United States are *H. nubilata*, *H. transfugatus*, *H. marginatus* and *H. flavocephalus*, all of which possess color patterns different from that of *militaris*. The unique female holotype of *H. militaris* is labeled "(orange disc)/4655/Type 6726/*Hyperaspis militaris* Lec.".

Type locality. Columbia, South Carolina.

Type depository. MCZ.

Distribution. Figure 287. ALABAMA: Barbour Co., Spring Hill. FLORIDA: Duval Co., Jacksonville; Gadsden Co., Mt. Pleasant; Lee Co., Fort Myers, Estero; Pinellas Co., St. Petersburg; Putnam Co., Crescent City; Volusia Co., Enterprise. SOUTH CAROLINA: Richland Co., Columbia.

Hyperaspidius tristis (LeConte), new combination

Fig. 300a-d; Map, Fig. 301

Hyperaspis tristis LeConte, 1880, p. 188.—Casey, 1899, p. 128.—Korschefsky, 1931, p. 198.—Dobzhansky, 1941, p. 85.

Hyperaspidius conspiratus Casey, 1899, p. 131.—Korschefsky, 1931, p. 199. **New Synonymy.**

Diagnosis. Length 1.60 to 2.0 mm, width 1.0 to 1.50 mm. Form elongate, oval, lateral margin of elytron definitely curved. Head of male brown or yellowish brown with obscure yellow spot near eye; head of female dark brown. Pronotum of both sexes dark brown with lateral margin narrowly yellow or yellowish brown. Elytron typically dark brown with narrowly yellow lateral margin and apical yellow spot (Fig. 300d), apical spot and yellow lateral margin often feebly connected, or elytron almost entirely immaculate. Postcoxal line narrowly incomplete in both sexes, area within line alutaceous, punctation barely visible. Male genitalia as in Figure 300a-c.

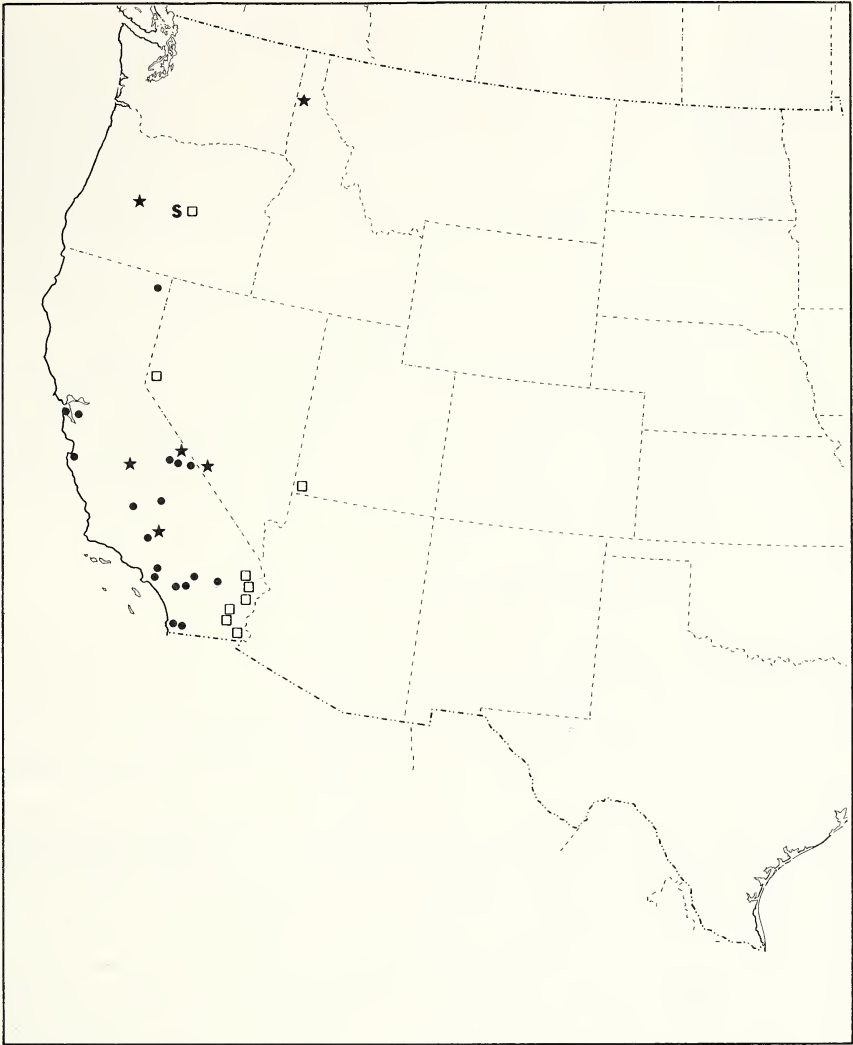


Fig. 301. Distribution. *Hyperaspidius tristis* (dot); *H. ploribundus* (star); *H. arcuatus* (square).

Discussion. The typical form of *H. tristis* is easily distinguished by the unique elytral color pattern. However, reduction of this pattern occurs until only a small yellow area on the humeral angle remains. There is also a tendency for a discal yellow vitta to form which I have seen culminated in a complete discal vitta in 3 specimens from Alameda Co., California. The rounded elytral margins and the mostly dark male head and pronotum will usually distinguish specimens of *H. tristis* that do not have the typical color pattern. The other species with a dark male head is *H. ploribundus* which has the lateral margins of the pronotum and elytron obviously dis-

continuous, and an oblong body form. There are 2 examples under *H. tristis* in the LeConte collection as stated by LeConte. The first of these, a female labeled "Cal./Hardy/494/Type 6722(red paper)/*H. tristis Lec.*" is here designated and labeled the lectotype. The second type specimen is a male of *Hyperaspis oculaticauda*. There are 4 types of *H. conspiratus* in the Casey collection. The first specimen, a male, is here designated and labeled the lectotype, the other 3 as paralectotypes. LeConte (1852) listed the type locality of *tristis* as "Col." (Colorado), but the specimen in his collection is clearly labeled "Cal." (California), and I regard the published type locality to be erroneous.

Type locality. Of *tristis*, California (lectotype here designated); of *conspiratus*, Paraiso Hot Springs, Monterey Co., California (lectotype here designated).

Type depository. of *tristis*, MCZ; of *conspiratus*, USNM (35222).

Distribution. Figure 301. CALIFORNIA: Alameda Co.; Inyo Co., Saline Valley, Saratoga Spring, Death Valley; Kern Co., Tehachapi Pass, Fort Tejon; Kings Co.; Los Angeles Co., Altadena; Glendora; Modoc Co., Min Pass; Monterey Co., Paraiso Hot Springs; Riverside Co., Riverside; San Timoteo Co.; San Bernardino Co., Cactus Flat; Cajon Pass, Rte 395; Desert Springs; San Diego Co., Morena Lake; San Francisco Co.; Tulare Co., Kaweah; Sequoia National Park.

Hyperaspidium ploribundus (Nunenmacher)

Fig. 302a-d; Map, Fig. 301

Hyperaspis ploribunda Nunenmacher, 1911, p. 74.

Hyperaspidium ploribunda: Leng, 1920, p. 212.—Korschefsky, 1931, p. 200.—Dobzhansky, 1941, p. 86.—Nunenmacher, 1944, p. 144.

Hyperaspidium immaculatus Hatch, 1961, p. 155. **New Synonymy.**

Hyperaspidium arcuatus: Hatch, 1961, p. 155.—Belicek, 1976, p. 309 (not *arcuatus* LeConte).

Diagnosis. Length 1.50 to 1.80 mm, width 1.10 to 1.40 mm. Form oblong, outline of pronotum and elytron abruptly discontinuous, lateral margin of elytron feebly curved (Fig. 302d). Head and pronotum in both sexes typically dark brown, anterolateral angle of pronotum often yellowish brown. Elytron reddish brown, often with humeral angle yellowish brown. Postcoxal line usually nearly complete in both sexes, area within line alutaceous, punctuation barely perceptible. Male genitalia as in Figure 302a-c.

Discussion. See comparative remarks under *H. tristis*. The few specimens examined show a rather wide geographic range with large gaps present. It is possible that more than one species is involved, but, based on the available evidence, I can identify only one species. I consider *H. immaculata* Hatch a junior synonym of *ploribundus*. There are 2 type specimens of *H. ploribundus*. One of these, a male labeled "Goldfield/Esmeralda Co., Nev. VI-29-07/Coll'd by F. W. Nunenmacher/Type. *Hyperaspis ploribunda* Nun." is here designated and labeled the lectotype, the other specimen is labeled a paralectotype.

Type locality. Of *ploribundus*, Goldfield, Esmeralda Co., Nevada (lectotype here designated); of *immaculatus*, Redmond, Oregon.

Type depository. Of *ploribundus* and *immaculatus*, CAS.

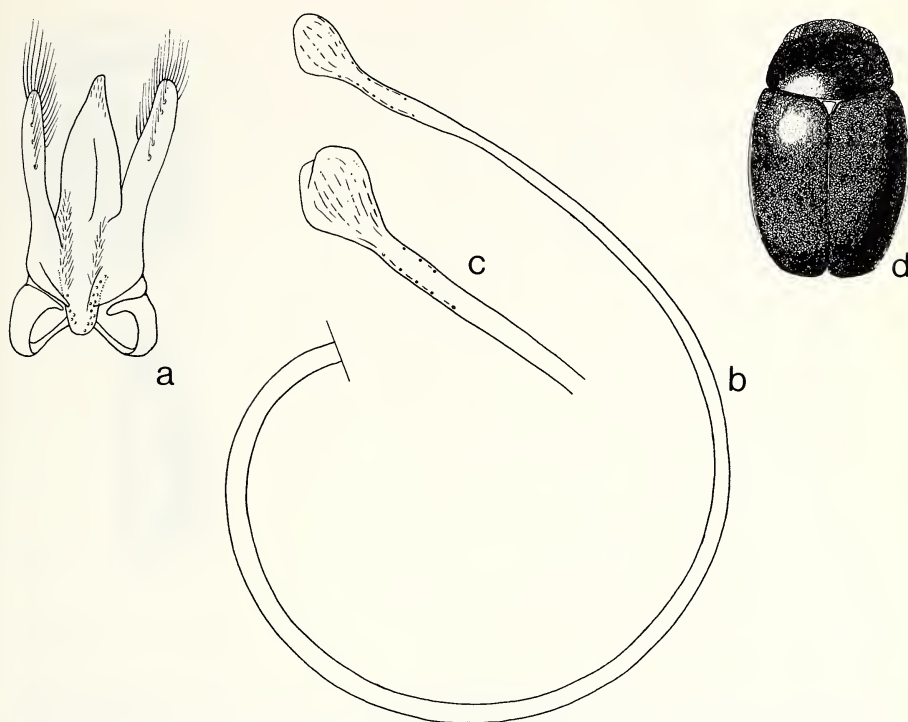


Fig. 302. *Hyperaspidius ploribundus*.

Distribution. Figure 301. CALIFORNIA: Fresno Co.; Inyo Co., Independence; Kern Co., Fort Tejon. IDAHO: Kootenai Co., Coeur d'Alene. NEVADA: Esmeralda Co., Goldfield. OREGON: Deschutes Co., Redmond.

Hyperaspidius arcuatus (LeConte)

Fig. 303a-e; Map, Fig. 301

Hyperaspis arcuata LeConte, 1852, p. 133.—Crotch, 1874b, p. 232.

Hyperaspidius arcuata: Crotch, 1873, p. 382.—Casey, 1899, p. 131.—Leng, 1920, p. 212.—Korschevsky, 1931, p. 199.

Hyperaspidius arcuatus: Belicek, 1976, p. 309.

Hyperaspidius rossi Nunenmacher, 1944, p. 145.—Hatch, 1961, p. 155. **New Synonymy.**

Diagnosis. Length 1.60 to 2.0 mm, width 1.20 to 1.50 mm. Form oblong, outline of pronotum and elytron abruptly discontinuous, lateral margin of elytron feebly curved. Pronotum of male black with yellow lateral margin, or with anterior and lateral margins yellow. Female not known. Elytron black with basal and lateral margins yellow, yellow lateral margin reaching midpoint (Fig. 303d), or complete to apex, apex often with yellow spot, often with discal vitta reaching apex (Fig. 303e).

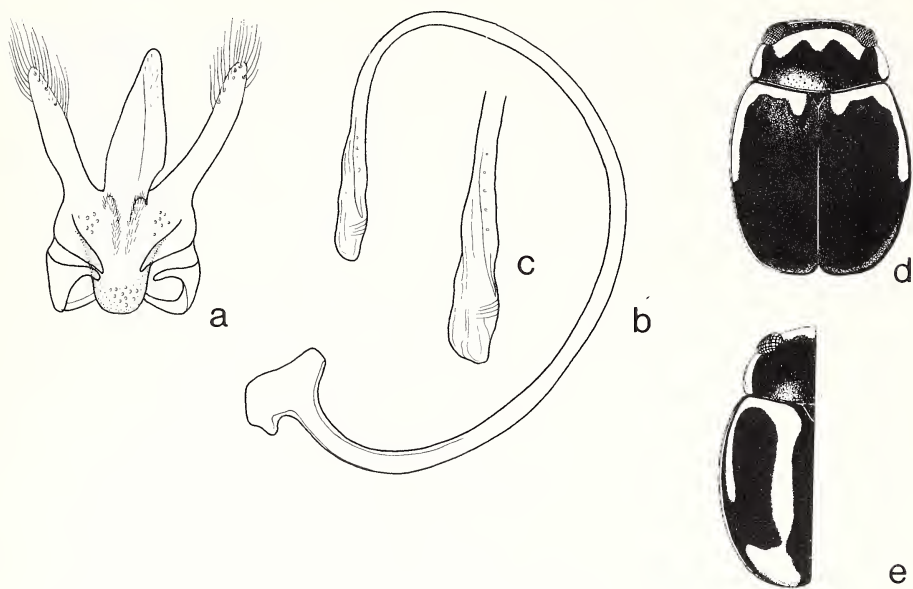


Fig. 303. *Hyperaspidius arcuatus*.

Postcoxal line complete (male), area within line feebly alutaceous, distinctly punctured. Male genitalia as in Figure 303a-c.

Discussion. Females were not available for examination, and all remarks refer to males. The forms with incomplete elytral maculation are outstanding in appearance and readily recognized, but the form with complete discal vittae resembles several other species of *Hyperaspidius*; and male genitalia must be examined in these instances. The female type of *rossi* appears to be an example of *H. arcuatus* and I consider *rossi* to be a junior synonym of *arcuatus*. The unique male holotype of *H. arcuatus* is labeled "(gold disc)/4657/Type 6727 (red paper)/*H. arcuata* Lec."

Type locality. Of *arcuatus*, "mouth of Gila River, California"; of *rossi*, Oregon.

Type depository. Of *arcuatus*, MCZ; of *rossi*, CAS.

Distribution. Figure 301. CALIFORNIA: Imperial Co., Algodones Dunes; Bard; Gila River; Glamis; Olgiby; Riverside Co., Blythe; San Bernardino Co., 5 mi. N. Buckmans Sp., sand dunes 10 mi. NW Kelso; San Diego Co., Borrego. NEVADA: Washoe Co., Glendale. UTAH: Washington Co., St. George.

***Hyperaspidius simulatus*, new species**

Fig. 304a-d; Map, Fig. 307

Description. Male, length 1.65 mm, width 1.10 mm. Form somewhat oblong, outline of pronotum and elytron slightly discontinuous, lateral margin of elytron distinctly rounded. Head yellow except vertex brown; pronotum brown with narrowly yellow lateral margin and broadly yellow anterior margin; elytron brown with broad

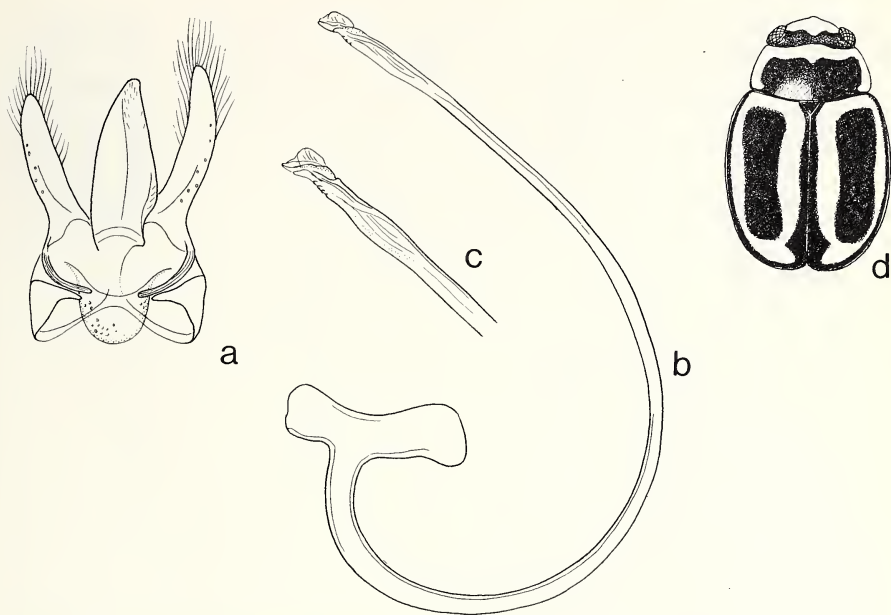


Fig. 304. *Hyperaspidius simulatus*.

lateral and discal vittae connected apically and posteriorly (Fig. 304d). Punctures on head fine, separated by a diameter or less; pronotal punctures fine, separated by one or 2 times a diameter; punctures on elytron slightly coarser than on pronotum, separated by 2 or 3 times a diameter. Metasternum with coarse, confluent punctures laterally, punctures very fine, sparse medially. Abdominal sterna with fine, dense punctures. Postcoxal line complete, area within line alutaceous, nearly impunctate. Male genitalia as in Figure 304a-c.

Variation. Length 1.60 to 1.70 mm. Apical border of brown area on pronotum may have a median, v-shaped indentation.

Holotype. Male. CALIFORNIA: Etiwanda, San Bernardino Co., VII-27-1972, Collector E. L. Paddock USNM(101333).

Paratypes. Total 6 (Fig. 307). CALIFORNIA: same data as holotype. (USNM) (CDA).

There are no external characteristics that will, with certainty, distinguish this species from several other vittate species of *Hyperaspidius*. The character that must be seen is the large, rounded lateral projection on the basal lobe of the male genitalia which is unlike that of any other species examined. I have restricted the specimens designated as type material to the type locality, however, there are other specimens I regard as this species from the following localities. Arizona: Coconino Co., Page; Cochise Co; 7 mi. S. Picacho, Pinal Co.; Rillito River near Tucson. California: Kings Co.; Riverside; Tulare Co. The specific name is from the Latin *similis*, referring to the similarity in dorsal color pattern to several other species of *Hyperaspidius*.

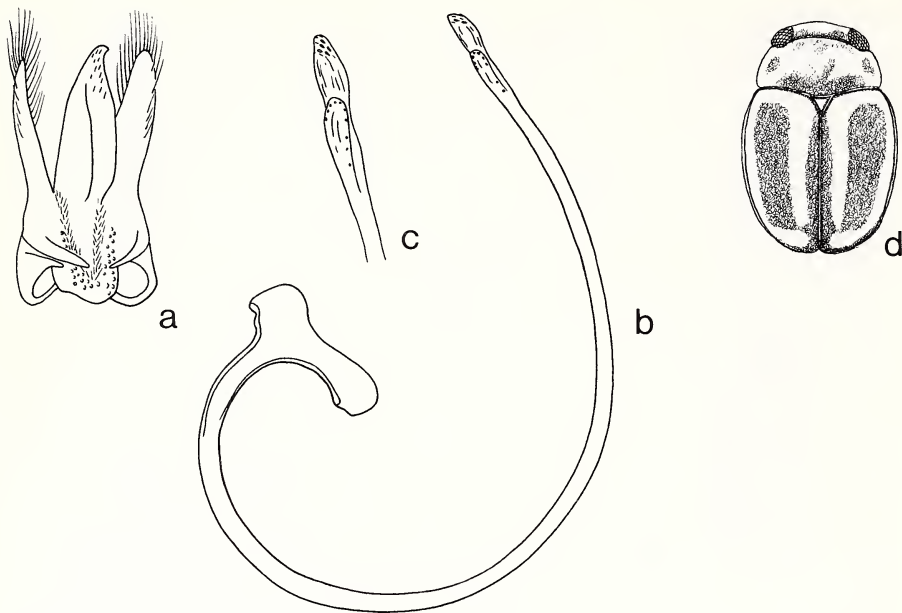


Fig. 305. *Hyperaspidius pallescens*.

Hyperaspidius pallescens Casey

Fig. 305a-d; Map, Fig. 307

Hyperaspidius pallescens Casey, 1908, p. 420.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 199.

Diagnosis. Length 1.60 to 2.10 mm, width 1.10 to 1.60 mm. Form oblong, lateral margin of elytron distinctly curved. Pronotum of male yellow with indistinct yellowish brown maculation; pronotum of female uniformly yellowish brown except lateral margin narrowly yellow. Elytron with 2 broad, yellow vittae not connected, or narrowly connected at apex (Fig. 305d). Postcoxal line complete in both sexes, area within line alutaceous, punctation barely perceptible. Male genitalia as in Figure 305a-c.

Discussion. Thus far *H. pallescens* is known only from Arizona. The male and female pronotal color pattern will distinguish this species from other presently known Arizona species, and the feebly curved lateral projection on the basal lobe of the male genitalia is diagnostic. The type of *pallescens* is a unique male (holotype).

Type locality. Nogales, Santa Cruz Co., Arizona.

Type depository. USNM (35220)

Distribution. Figure 297. ARIZONA: Cochise Co., Chiricahua Mountains; Huachuca Mountains, Miller Canyon; Pinal Co., Oracle; Santa Cruz Co., Nogales; Santa Rita Mountains, Madera Canyon.

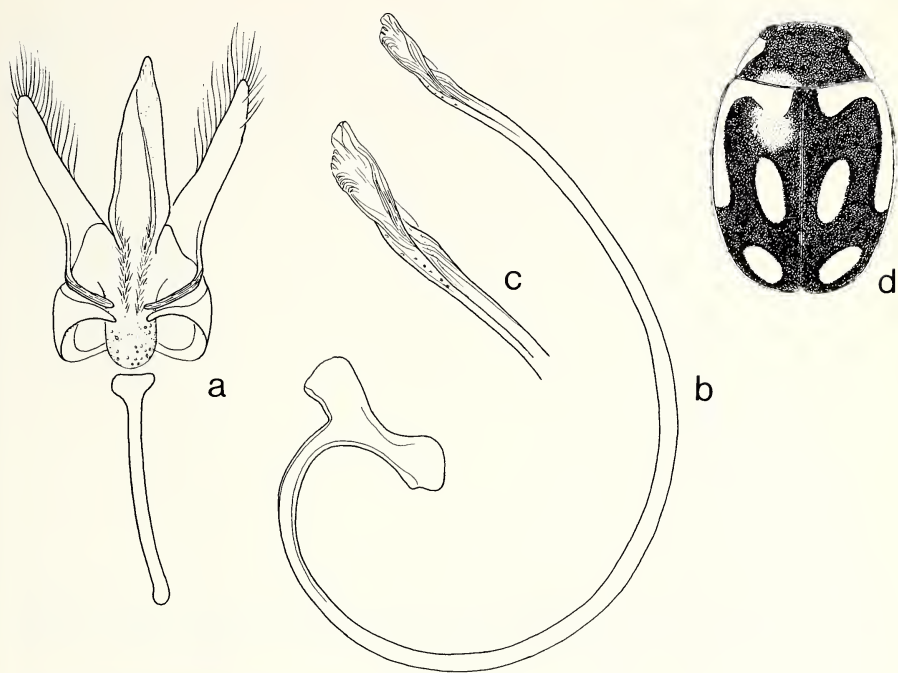


Fig. 306. *Hyperaspidioides bryanti*.

Hyperaspidioides bryanti Nunenmacher
Fig. 306a-d; Map, Fig. 307

Hyperaspidioides bryanti Nunenmacher, 1948, p. 7.

Diagnosis. Length 1.80 to 2.0 mm, width 1.10 to 1.45 mm. Form oblong, lateral margin of elytron feebly curved. Pronotum of male yellow with basal $2/3$ dark brown except lateral margin yellow; female pronotum dark reddish brown except lateral margin narrowly yellow. Elytron with lateral and discal vittae connected across base, extending to posterior $2/3$, broadly separated from apical spot, or with discal vitta reduced to discal spot (Fig. 306d). Postcoxal line narrowly incomplete in both sexes, area within line alutaceous, distinctly punctured. Male genitalia as in Figure 306a-c.

Discussion. The form with the discal vitta on the elytron reduced to a spot is very distinctive, unlike any other species known from Arizona. The typical form is less striking, but the widely separated apical spot is unusual. The male genitalia are quite different from those of other species of *Hyperaspidioides* in the triangular form of the basal lobe.

Type locality. Santa Catalina Mts., Arizona.

Type depository. CAS.

Distribution. Figure 307. ARIZONA: Cochise Co., Dragoon. Coconino Co., Sedona. Pima Co., Tucson. Santa Cruz Co., Sonoita.

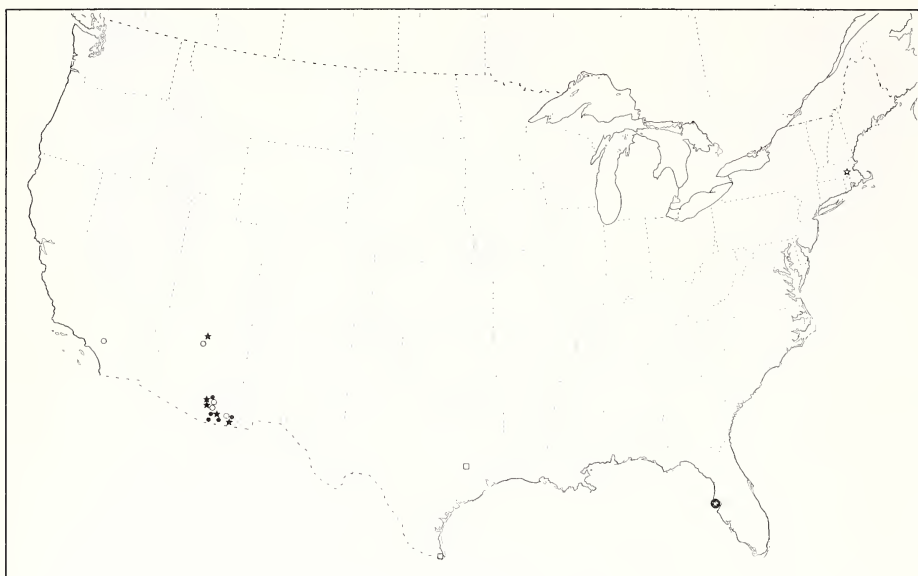


Fig. 307. Distribution. *Hyperaspidius simulatus* (open circle); *H. pallescens* (dot); *H. bryanti* (star); *H. nanella* (square); *H. flavocephalus* (circled star); *H. blatchleyi* (open star).

***Hyperaspidius nanellus*, new species**

Fig. 308a–d; Map, Fig. 307

Description. Male, length 2.0 mm, width 1.15 mm. Form oblong, outline of pronotum and elytron slightly discontinuous, lateral margin of elytron feebly rounded. Head yellow except vertex yellowish brown; pronotum yellow with obscure brownish yellow maculation in basal 1/3; elytron entirely yellow (fig. 308d). Punctures on head fine, separated by a diameter or less; pronotal punctures slightly coarser than on head, separated by a diameter or less; punctures on elytron coarser than on pronotum, separated by less than to twice a diameter. Metasternum with fine, dense punctures laterally, nearly impunctate medially. Abdominal sterna with fine, dense punctures. Postcoxal line complete (male) or widely incomplete (female), area within line alutaceous, nearly impunctate. Male genitalia as in Figure 308a–c.

Holotype. Male. TEXAS: Brownsville, VII, Wickham, *Hyperaspis? cinctus?*, Wickham Collection USNM (101334).

Allotype. Female. TEXAS: Prairie 10 mi. NE Brownsville, 25.5.04, HS Barber Collector. (USNM).

Paratype. Total 1 (Fig. 307). TEXAS: Burleson Co., 4/11/34, J.C. Gaines Collector (WHN).

The entirely pale elytron of this species distinguishes it from all other species except *H. transfugatus* which has no maculation on the pronotum and is known only from east of the Mississippi River and Minnesota. The specific name is from the Latin *nanus*, referring to the small size and generally insignificant appearance.

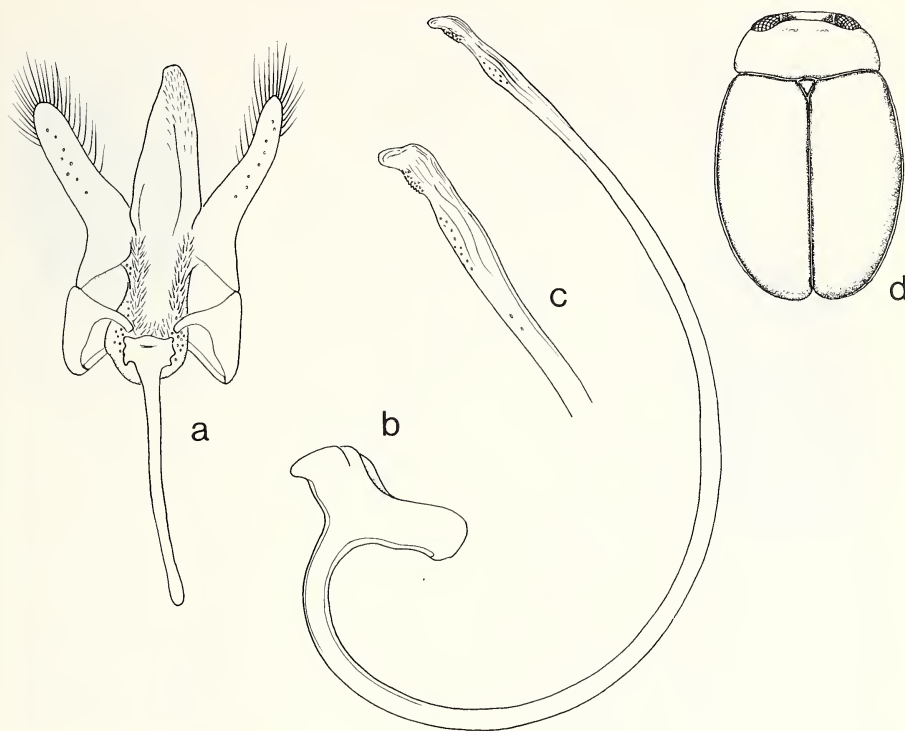


Fig. 308. *Hyperaspidius nanella*.

vittigerus group

Prosternum coarsely, often densely punctured; male genitalia with basal lobe not longer than paramere, with strong, abrupt lateral angulation in basal $\frac{1}{3}$ (Fig. 309a).

Hyperaspidius flavocephalus Blatchley

Fig. 309a-d; Map, Fig. 307

Hyperaspidius flavocephalus Blatchley, 1924, p. 167.—Korschefsky, 1931, p. 199.

Diagnosis. Length 2.0 mm, width 1.60 mm. Form oblong, lateral margin of elytron nearly straight. Pronotum of male reddish yellow with irregular, obscure brown maculation in basal $\frac{1}{3}$. Elytron black except humeral angle narrowly yellow on margin from base to just beyond callus (fig. 309d). Postcoxal line narrowly incomplete, area within line alutaceous, coarsely punctured. Male genitalia as in Figure 309a-c.

Discussion. The male holotype is the only specimen of this species examined. I regard *H. flavocephalus* as a valid species, but it is very similar in appearance to *H. nubilatus* and *H. marginatus*; the male genitalia of each species are apparently distinctive, and the dorsal color patterns are also different for each species. See remarks under *H. blatchleyi*, n. name. The holotype of *H. flavocephalus* is labeled "Dunedin,

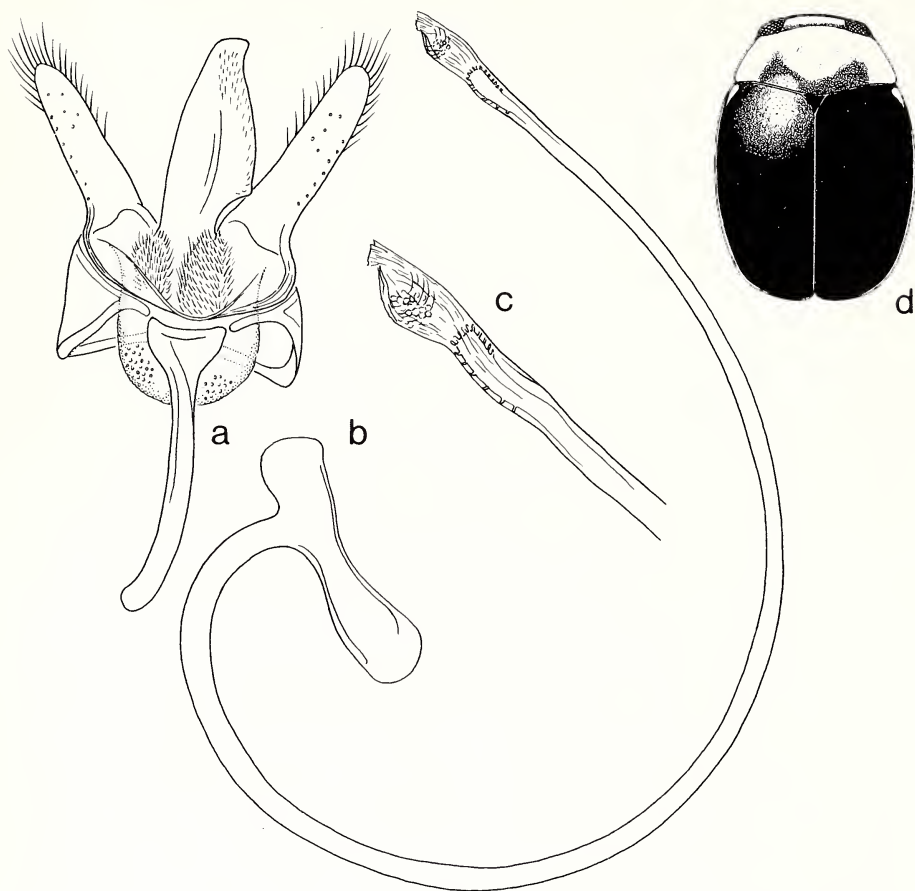


Fig. 309. *Hyperaspidium flavocephalus*.

Fla W.S.B. Coll. 3-27-18/822/Purdue Blatchley collection/Type(red paper)/*Hyperaspidium flavocephalus* Blatchley.”.

Type locality. Dunedin, Florida.

Type depository. PU.

Distribution. Figure 307. FLORIDA: Pinellas Co., Dunedin.

Hyperaspidium blatchleyi, new name

Fig. 310a-e; Map, Fig. 307

Hyperaspidium flavocephalus Marshall, 1945, p. 177 (not *flavocephalus* Blatchley, 1924).

Diagnosis. Length 1.90 to 2.40 mm, width 1.30 to 1.60 mm. Form rounded, oval, lateral margin of elytron definitely curved. Head and pronotum yellow, pronotum

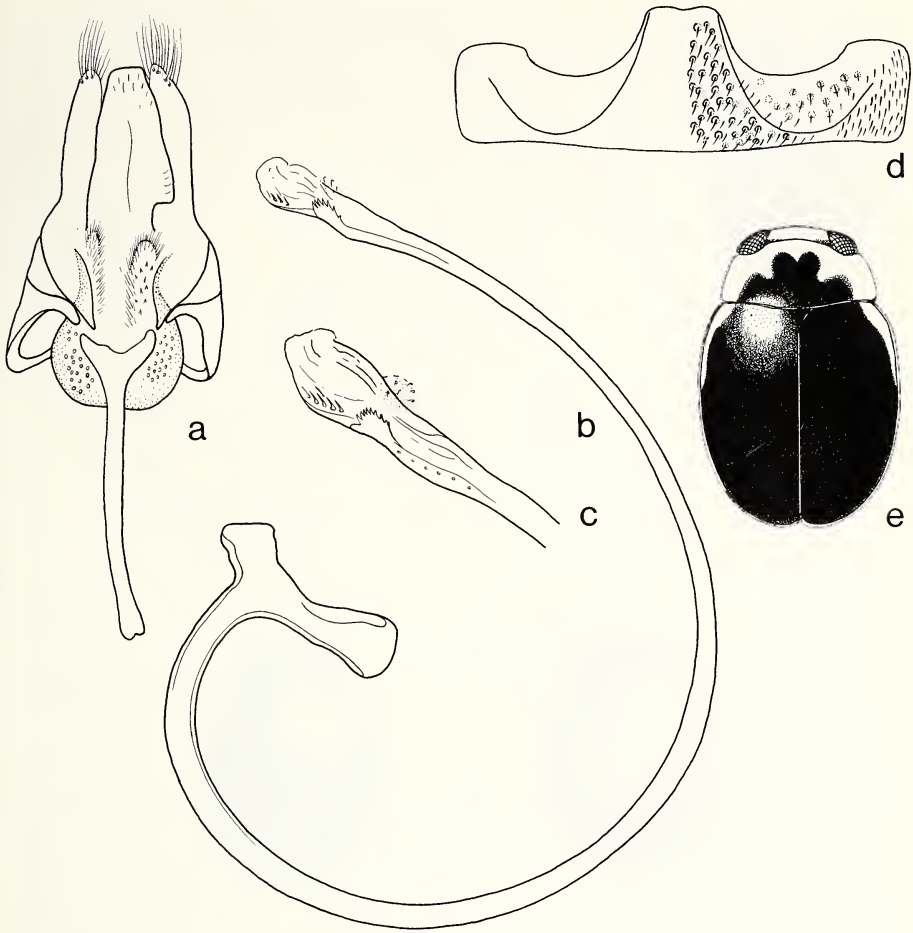


Fig. 310. *Hyperaspidius blatchleyi*.

with median black area at base projecting forward at middle. Elytron black with short, yellow vitta on lateral margin from humeral angle to middle (Fig. 310e). Surface of head alutaceous, finely punctured, punctures separated by 2 or 3 times a diameter; surface of pronotum strongly alutaceous, punctures larger than on head, separated by 2 or 3 times a diameter; surface of elytron smooth, punctures coarse, larger than on pronotum, separated by 2 to 4 times a diameter. Metasternum coarsely, densely punctured laterally, nearly impunctate medially. Abdominal sterna densely, coarsely punctured; postcoxal line narrowly incomplete, area within line alutaceous, coarsely punctured (Fig. 310d). Male genitalia as in Figure 310a-c.

Type locality. Berlin, Massachusetts.

Type depository. Location of allotype unknown.

Distribution. Figure 307. MASSACHUSETTS: Berlin; Natick; Wayland.

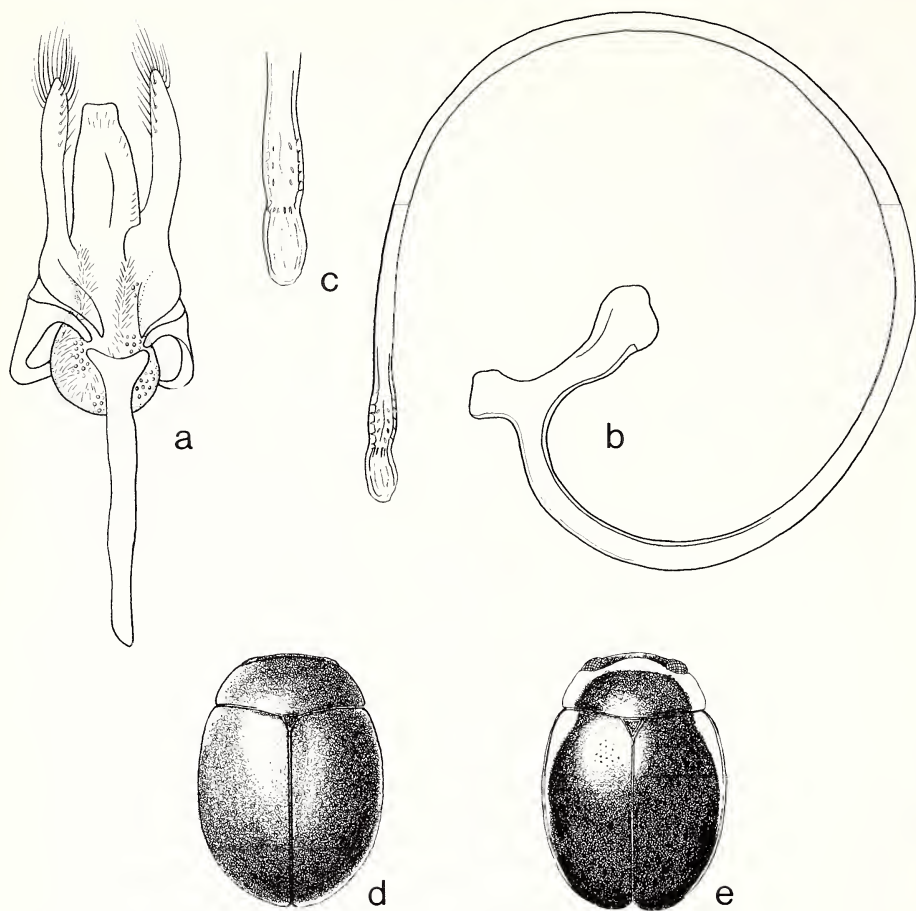


Fig. 311. *Hyperaspis nubilatus*.

Discussion. This species has been identified as *H. flavocephalus* Blatchley by previous authors. However, the male pronotal color patterns are quite different; the body form of *H. blatchleyi* is rounded, that of *H. flavocephalus* is oblong. In addition, the male genitalia are distinctive for each species. I name this species for W. S. Blatchley. Marshall (1945) discussed this species under the name *H. flavocephalus* Blatchley, and described an allotype and paratypes.

Hyperaspis nubilatus (Casey), new combination

Figs. 311a-e; Map, Fig. 314

Hyperaspis nubilata Casey, 1924, p. 166.—Korschefsky, 1931, p. 193.

Hyperaspis asphaltina Casey, 1924, p. 166.—Korschefsky, 1931, p. 184.—Dobzhansky, 1941, p. 83. **New Combination.**

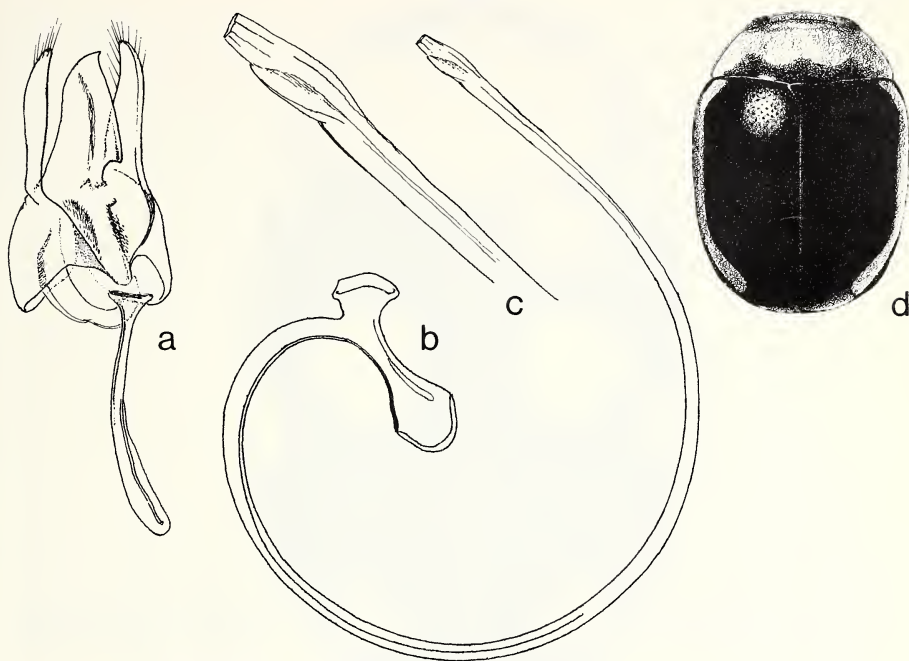


Fig. 312. *Hyperaspidius marginatus*.

Diagnosis. Length 1.80 to 2.70 mm, width 1.30 to 2.0 mm. Form oblong, lateral margin of elytron feebly curved. Pronotum of male black or dark brown with nebulous black areas in basal $\frac{1}{2}$, always with lateral margin narrowly yellow; female pronotum entirely black except anterior angle obscurely yellowish brown. Elytron black except humeral angle obscurely yellowish brown, or with yellow vitta extending from humeral angle to middle (Fig. 311d, e), occasional specimens with nebulous brown areas. Postcoxal line narrowly incomplete (male) or widely incomplete (female), area within line alutaceous, distinctly punctured. Male genitalia as in Figure 311a-c.

Discussion. This species most closely resembles *H. flavocephalus* (see comments under that species) and *H. marginatus*. In *H. marginatus* the lateral margin of the elytron is yellow from the humeral angle to the apex. In *H. nubilatus* the margin is either not yellow or yellow from the humeral angle to the midpoint. The type of *H. nubilatus* is a unique female (holotype). There are 8 types of *H. asphaltina*, and I here designate and label a male as the lectotype and the remainder as paralectotypes.

Type locality. Of *nubilatus* and *asphaltina* (lectotype here designated), Southern Pines, North Carolina.

Type depository. Of *nubilatus* (35156) and *asphaltina* (35157), USNM.

Distribution. Figure 314. FLORIDA: Duval Co., Jacksonville. GEORGIA: Grady Co., Beachton, Hutchison Place; Dodge Co., Chester. NORTH CAROLINA: Moore Co., Southern Pines.

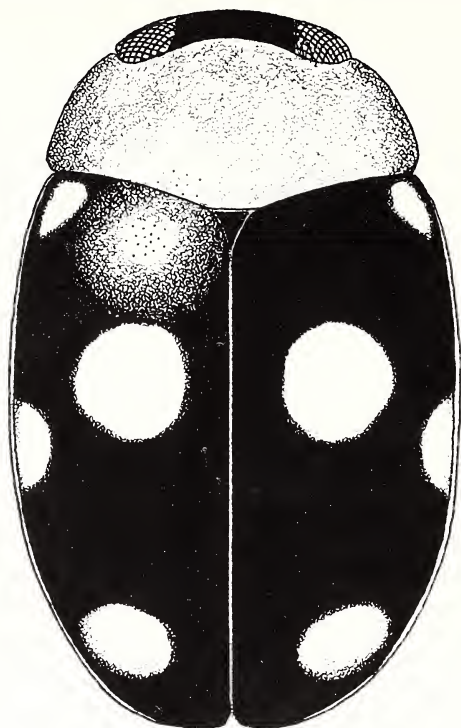


Fig. 313. *Hyperaspidius venustus*.

Hyperaspidius marginatus (Gaines), new combination

Fig. 312a-d; Map, Fig. 314

Hyperaspis fimbriolata marginatus Gaines, 1933, p. 263.

Hyperaspis marginata: Dobzhansky, 1941, p. 58.

Diagnosis. Length 1.75 to 2.40 mm, width, 1.30 to 1.75 mm. Form oblong, lateral margin of elytron feebly curved. Head yellow or brownish yellow in both sexes. Pronotum reddish brown with nebulous brown maculation in male and some females, other females with pronotum dark brown except lateral border broadly yellow. Elytron dark brown or black with broad, yellow vitta on lateral margin from humeral angle nearly to apex (Fig. 312d). Postcoxal line in both sexes widely incomplete, area within line alutaceous, indistinctly punctured. Male genitalia as in Figure 312a-c.

Discussion. The complete yellow vitta on the lateral border of the elytron will separate *marginatus* from any other species of *Hyperaspidius*. The resemblance of *H. marginatus* to *Hyperaspis fimbriolata* is remarkable, and that resemblance is the reason *H. marginatus* was described as a subspecies of *fimbriolata* in *Hyperaspis*. Dobzhansky (1941) raised it to species level.

Type locality. College Station, Texas.

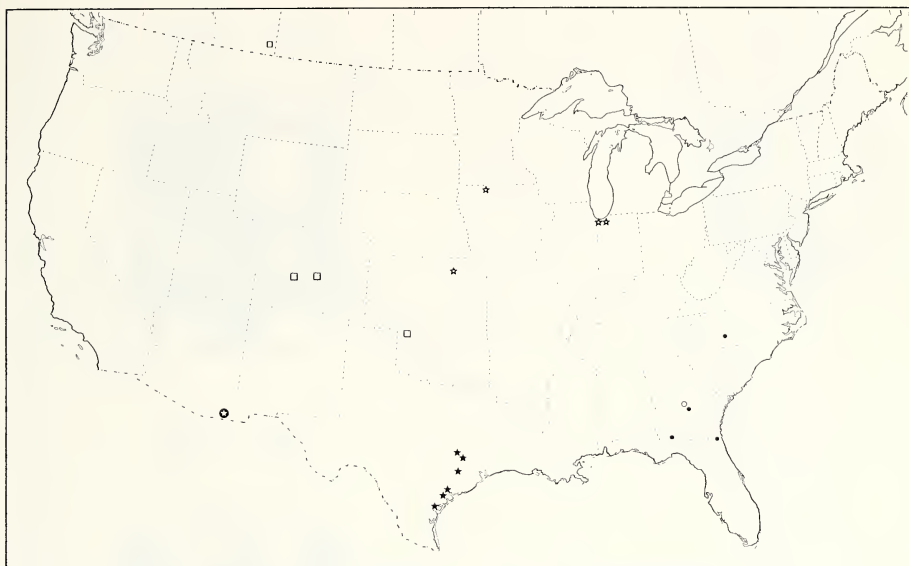


Fig. 314. Distribution. *Hyperaspis nubilatus* (dot); *H. marginatus* (star); *H. venustus* (open circle); *H. insignis* (square); *H. algodonus* (circled star); *H. wolcottii* (open star).

Type depository. USNM (53746).

Distribution. Figure 314. TEXAS: Brazos Co., College Station; Colorado Co., Columbus; Refugio Co., Refugio; Robertson Co., Calvert; San Patricio Co., Sinton, Welder Wildlife Refuge; Victoria Co., Victoria.

Hyperaspis venustus (Mulsant)

Fig. 313; Map, Fig. 314

Hyperaspis venustula Mulsant, 1850, p. 671.—Crotch, 1873, p. 381 (as a synonym of *Hyperaspis lugubris*).—Crotch, 1874b, p. 235.—Weise, 1895a, p. 129.—Korschefsky, 1931, p. 192.—Dobzhansky, 1941, p. 21.

Hyperaspis venustus: Gordon, 1974c, p. 210.

Diagnosis. Length 2.80 mm, width 1.85 mm. Form elongate, lateral margin of elytron rounded in apical $\frac{1}{2}$. Pronotum yellowish red. Elytron black with 4 yellow spots (Fig. 313). Postcoxal line reaching hind margin of first abdominal sternum, narrowly incomplete, area within line alutaceous, nearly impunctate.

Discussion. I have seen only two specimens of this species, one of which is the female lectotype, and another female from Georgia. The large size, elongate body, and dorsal color pattern make *H. venustus* an outstanding species that is unlike any other North American species of *Hyperaspini*.

Type locality. "Amer. bor., LeConte" (lectotype designated by Gordon, 1974c).

Type depository. Dejean Collection (DLM).

Distribution. Figure 314. GEORGIA: Myrtle.

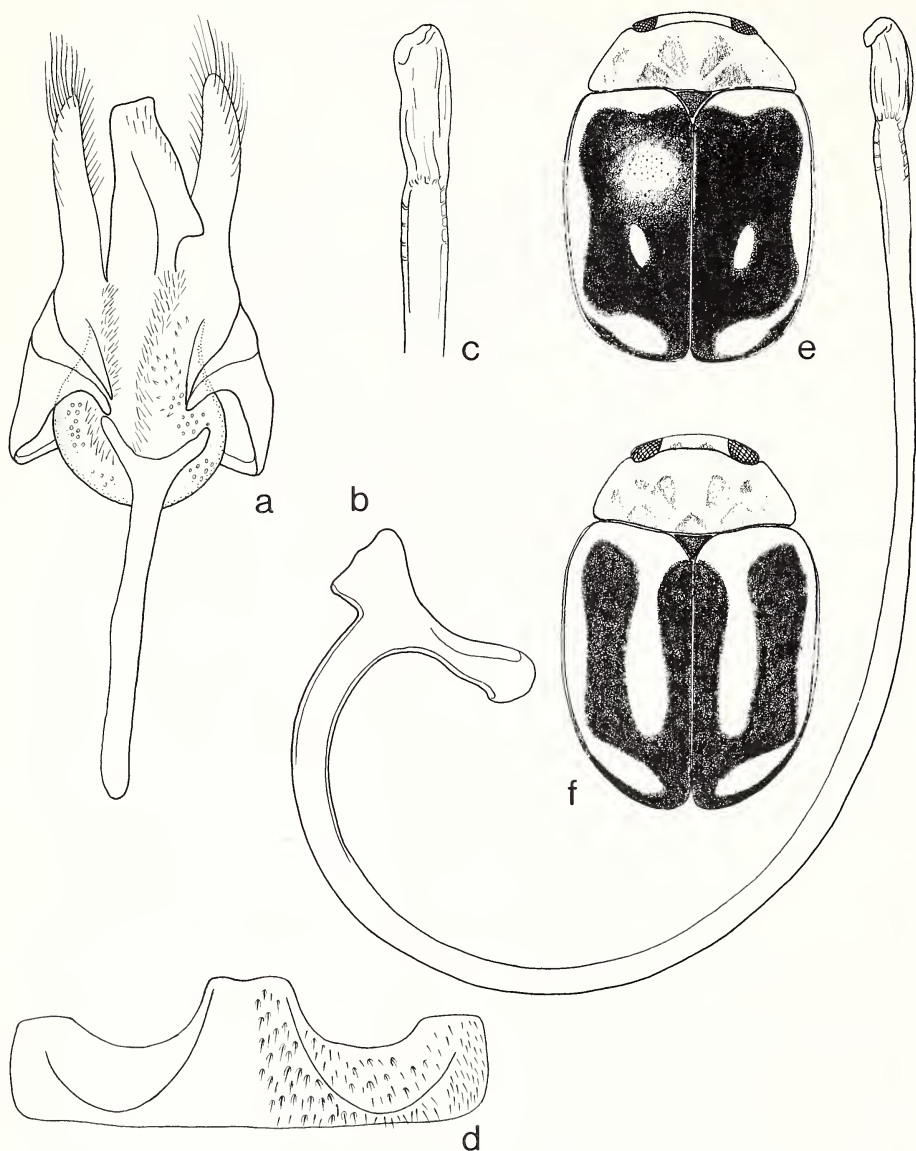


Fig. 315. *Hyperaspidius insignis*.

Hyperaspidius insignis Casey

Fig. 315a-f; Map, Fig. 314

Hyperaspidius insignis Casey, 1899, p. 131.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 199.

Diagnosis. Length 2.25 to 3.20 mm, width 1.60 to 2.0 mm. Form oblong, lateral

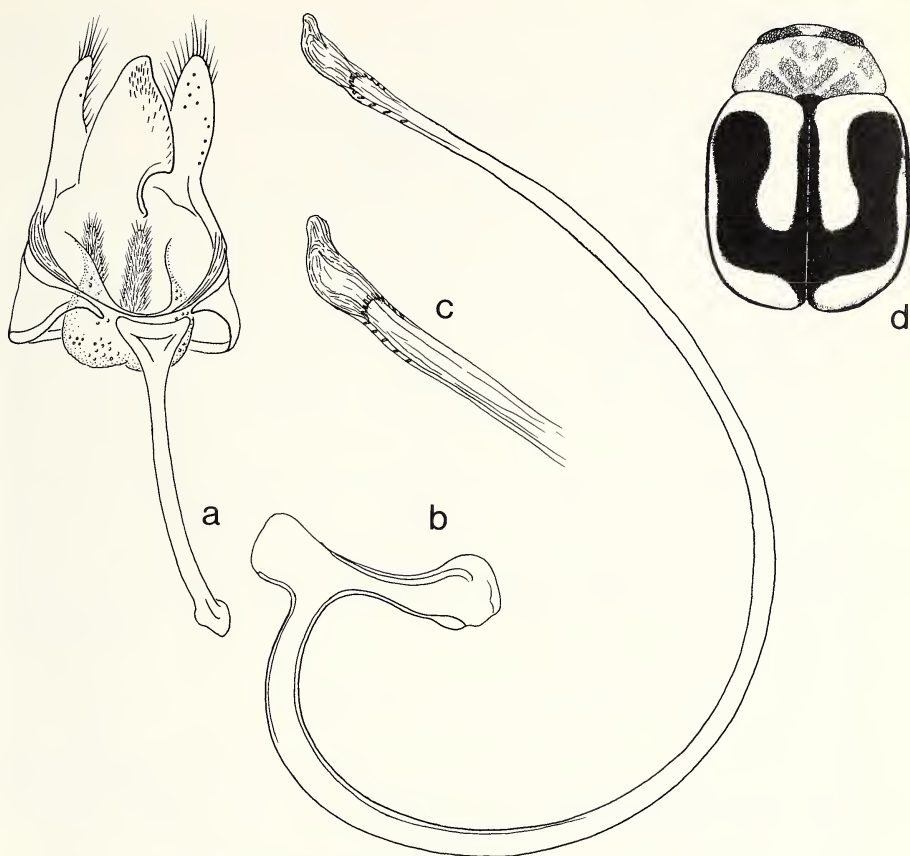


Fig. 316. *Hyperaspidius algodonus*.

margin of elytron feebly curved. Head pale in both sexes. Pronotum in both sexes yellow with reddish yellow maculation, often reddish yellow with reddish brown maculation. Elytron black with complete yellow border on anterior and lateral margins, discal spot on apical ' sometimes connected to anterior border (Figs. 315e, f). Postcoxal line narrowly incomplete in both sexes (Fig. 315d), area within line alutaceous, distinctly punctured. Male genitalia as in Figure 315a-c.

Discussion. The pale pronotum and head in both sexes along with the usually large, robust body form distinguish *H. insignis* from other members of the *vittigerus* group. No known species occurring in the same geographic area is similar in appearance. There are 2 type specimens of *H. insignis* in the Casey collection, I here designate and label a male as the lectotype, and the other, a female, as a paralectotype.

Type locality. Colorado Springs, Colorado (lectotype here designated).

Type depository. USNM (35219).

Distribution. Figure 314. ALBERTA: Medicine Hat. COLORADO: Chaffee Co.,

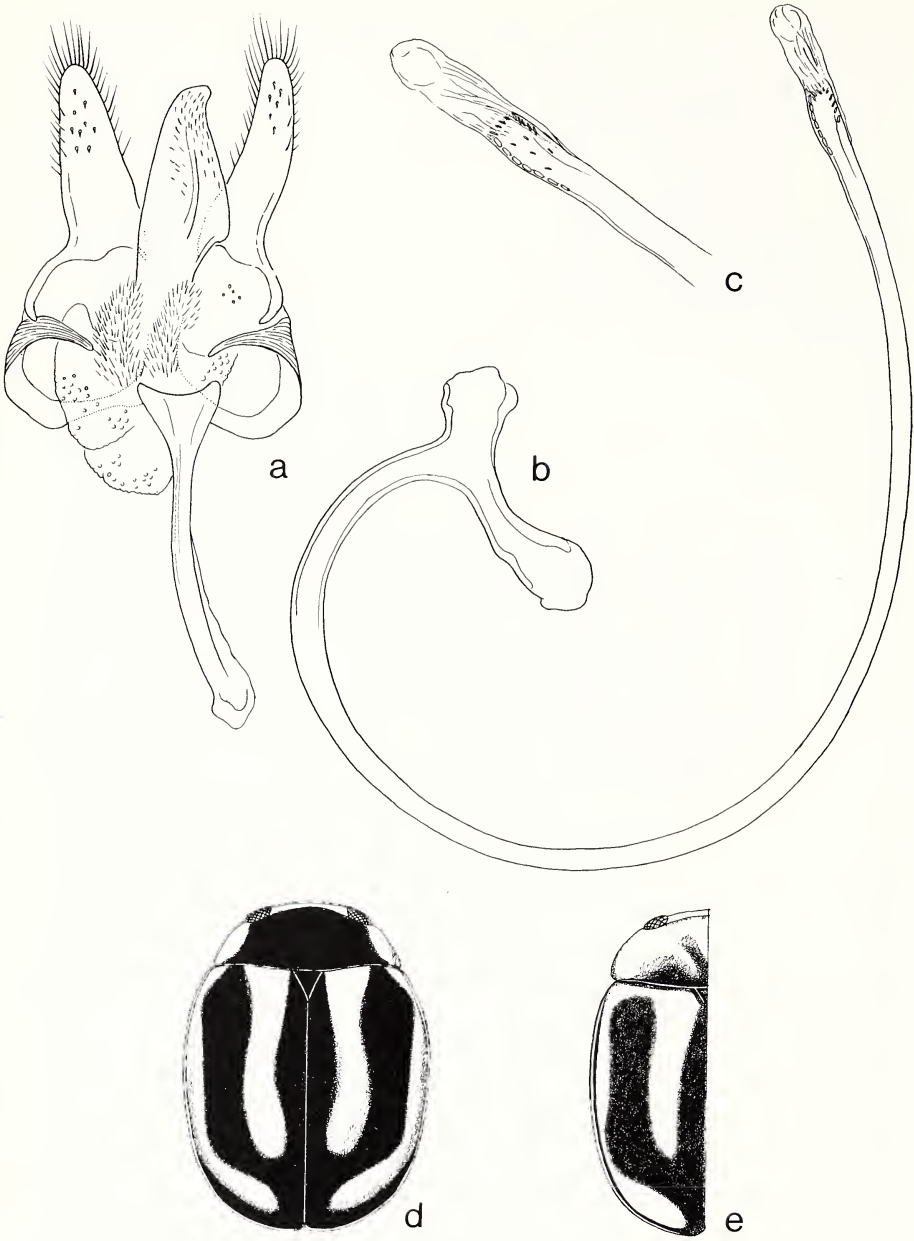


Fig. 317. *Hyperaspidius wolcottii*.

Buena Vista; El Paso Co., Colorado Springs. OKLAHOMA: Woodward Co., Woodward.

***Hyperaspidium algodonus*, new species**

Fig. 316a-d; Map, Fig. 314

Description. Male, length 2.0 mm, width 1.40 mm. Form oblong, lateral margin of elytron straight. Head and pronotum yellow, pronotum with faint, nebulous maculation in basal $\frac{1}{2}$. Elytron black with complete yellow vitta on anterior and lateral borders connected to incomplete discal vitta (Fig. 316d). Punctures on head and pronotum extremely fine, barely perceptible, surface of pronotum smooth, polished; punctures on elytron fine, distinct, separated by one to 3 times a diameter. Metasternum coarsely, densely punctured laterally, nearly impunctate medially. Abdominal sterna with fine punctures separated by 2 or 3 times a diameter. Postcoxal line narrowly incomplete, area within line alutaceous, nearly impunctate. Male genitalia as in Figure 316a-c.

Holotype. Male. CALIFORNIA: Imperial Co., Algodones Dunes, 7 mi SE Glamis, 25°55'20"N, 114°59'14"W, Site 4, III-25-79 to IV-8-1979 (USNM 101335).

The holotype is the only example of this species I have seen. The dorsal color pattern is like that of *H. insignis*, but the pronotal surface is smooth and polished in *H. algodonus*, dull and alutaceous in *H. insignis*. The specific name refers to the type locality.

Hyperaspidium wolcottii (Nunenmacher)

Fig. 317a-e; Map, Fig. 314

Hyperaspis wolcottii Nunenmacher, 1911, p. 73.

Hyperaspidium wolcottii: Leng, 1920, p. 212.—Korschefsky, 1931, p. 200.—Dobzhansky, 1941, p. 86.—Nunenmacher, 1944, p. 144.—Wingo, 1952, p. 26.

Diagnosis. Length 2.0 to 2.60 mm, width 1.40 to 1.80 mm. Form oblong, convex, somewhat rounded, lateral margin of elytron curved. Pronotum of male yellow with black maculation in basal $\frac{1}{2}$; female pronotum black, lateral margin broadly yellow. Elytron black with complete yellow vitta on lateral margin, irregular, incomplete discal vitta present (Fig. 317d, e). Postcoxal line narrowly incomplete in both sexes, area within line alutaceous, densely, coarsely punctured. Male genitalia as in Figure 317a-c.

Discussion. The rounded, convex body form and dorsal color pattern will separate *H. wolcottii* from any species presently known from the same geographic area. The species most similar to *H. wolcottii* is *H. hercules*, but the distribution patterns are widely disjunct.

Type locality. Pine Barrens, Buffington, Indiana.

Type depository. CAS.

Distribution. Figure 314. INDIANA: Lake Co., Buffington, Pine Barrens; Hessville. IOWA: Emmett Co., Estherville. KANSAS: Riley Co.

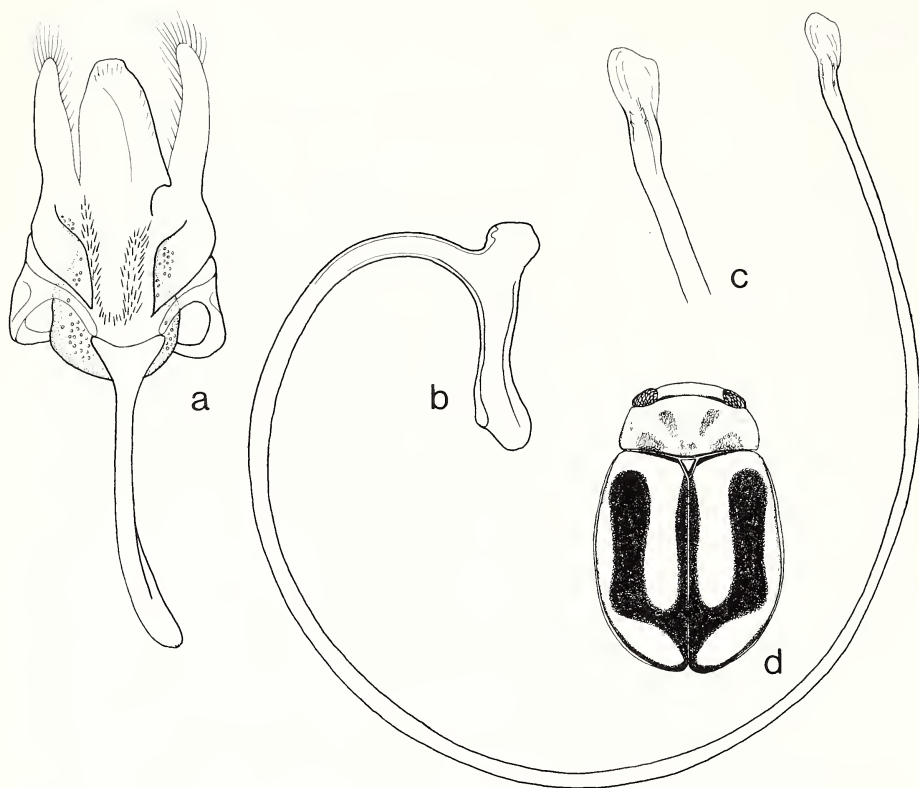


Fig. 318. *Hyperaspidius oblongus*.

Hyperaspidius oblongus Casey
Fig. 318a-d; Map, Fig. 320

Hyperaspidius oblongus Casey, 1908, p. 421.—Leng, 1920, p. 212.—Korschevsky, 1931, p. 199.

Hyperaspidius trimaculatus: Casey, 1899, p. 130 (not *trimaculatus* L., 1767).

Diagnosis. Length 1.70 to 2.30 mm, width 1.20 to 1.65 mm. Form oblong, somewhat convex, lateral margin of elytron straight. Pronotum of male yellow with nebulous brown maculation in basal $\frac{1}{2}$; female pronotum black with lateral margin narrowly yellow. Elytron black with complete yellow vitta on anterior and lateral borders connected to incomplete discal vitta (Fig. 318d). Postcoxal line narrowly incomplete in both sexes, area within line alutaceous, nearly impunctate. Male genitalia as in Figure 318a-c.

Discussion. This species, *H. shauli*, and *H. ingenitus* are very similar in appearance with *H. oblongus* and *H. ingenitus* being extremely similar. The pronotal punctures of *H. ingenitus* are definitely larger than the elytral punctures, the other two species have the elytral punctures larger than the pronotal punctures. The body form of *H.*

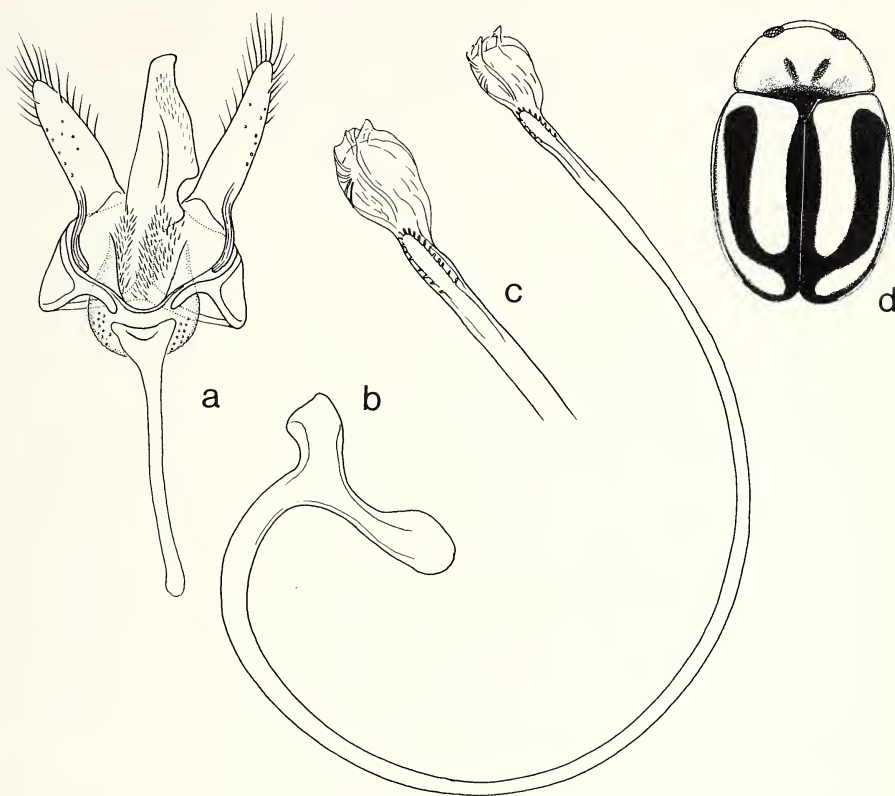


Fig. 319. *Hyperaspidium ingenitus*.

shauli is distinctive because it is strongly dorsoventrally flattened and the elytra are parallel sided, while *H. oblongus* is somewhat convex in lateral view and does not appear extremely parallel sided. It is possible that *H. oblongus* and *H. ingenitus* are conspecific; but there are differences in the male genitalia that I consider significant, therefore I regard each as a valid species. There are 4 type specimens of *H. oblongus*, I here designate and label a male as the lectotype, the remainder as paralectotypes.

Type locality. El Paso, Texas (lectotype here designated).

Type depository. USNM (35214).

Distribution. Figure 320. TEXAS: Colorado Co., Columbus; Duval Co., San Diego; El Paso Co., El Paso.

Hyperaspidium ingenitus Casey

Fig. 319a–d; Map, Fig. 320

Hyperaspidium ingenitus Casey, 1899, p. 131.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 199.

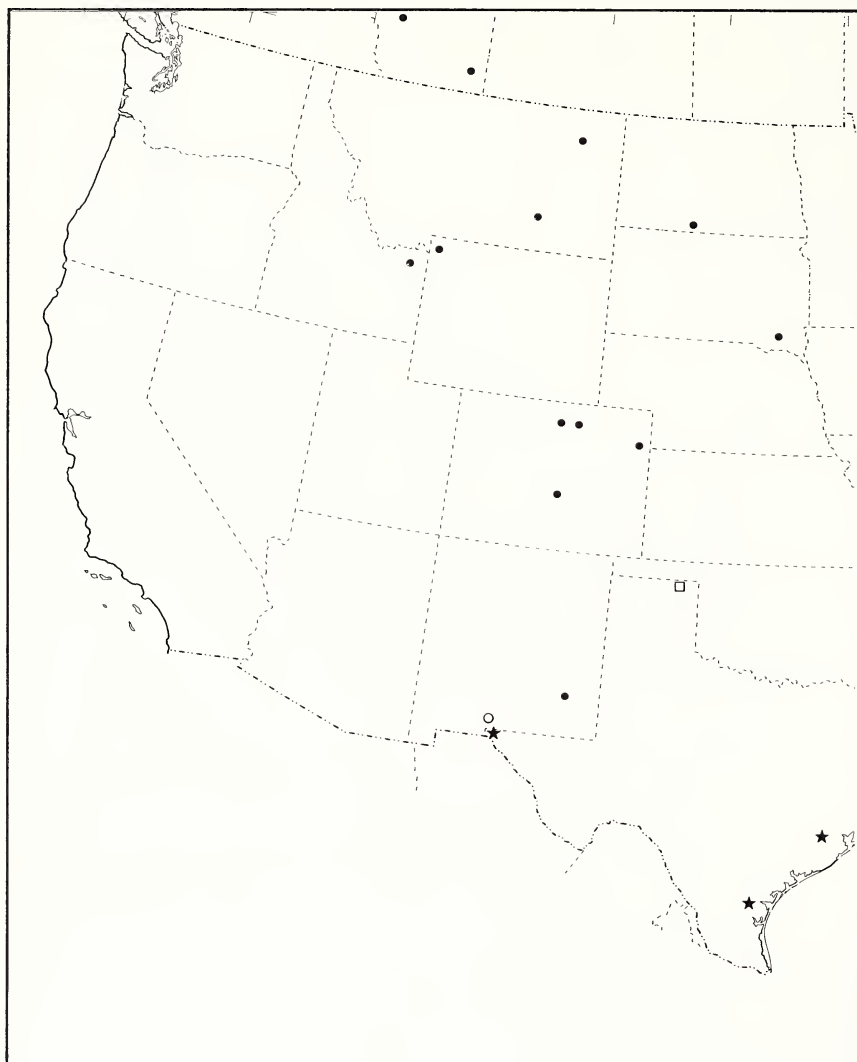


Fig. 320. Distribution. *Hyperaspdius oblongus* (star); *H. ingenitus* (open circle); *H. shauli* (square); *H. vittigerus* (dot).

Diagnosis. Length 1.75 to 2.50 mm, width 1.10 to 1.60 mm. Form oblong, lateral margin of elytron feebly curved (Fig. 319d). Description as for *H. oblongus* except area within postcoxal line coarsely, sparsely punctured; male genitalia as in Figure 319a-c.

Discussion. For comparison of *H. ingenitus* to similar appearing species, see comments under *H. oblongus*. The type of *H. ingenitus* is a unique male (holotype).

Type locality. Las Cruces, New Mexico.

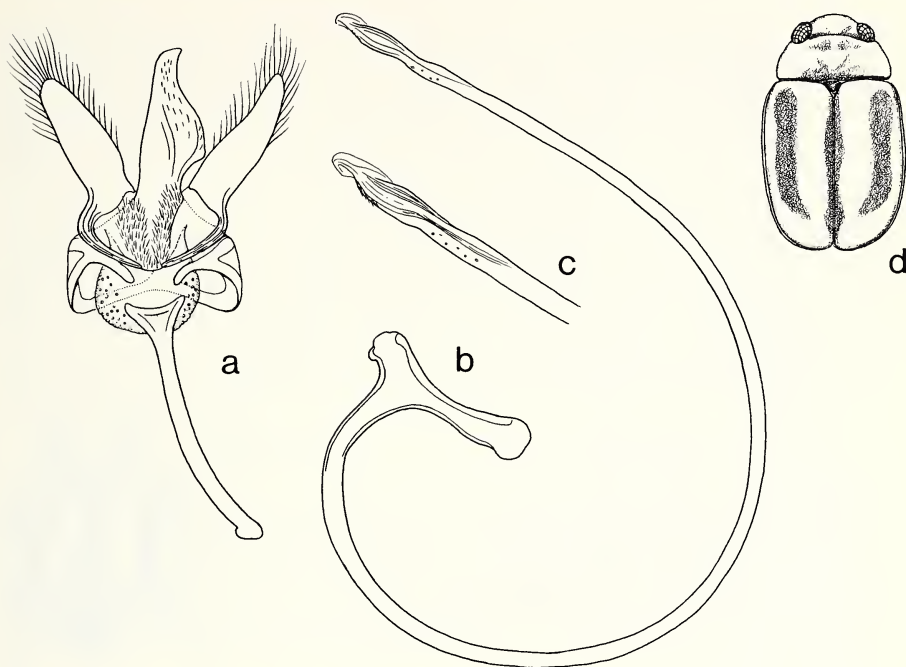


Fig. 321. *Hyperaspidius shauli*.

Type depository. USNM (35218).

Distribution. Figure 320. NEW MEXICO: Dona Ana Co., Las Cruces.

Hyperaspidius shauli Nunenmacher

Fig. 321a-d; Map, Fig. 320

Hyperaspidius shauli Nunenmacher, 1944, p. 145.

Diagnosis. Length 1.60 to 2.0 mm, width 0.90 to 1.10 mm. Form oblong, elongate, extremely parallel sided, strongly dorsoventrally flattened. Pronotum of male yellow with nebulous brown maculation in basal $\frac{1}{2}$; female pronotum mostly yellow with median brown area. Elytron brown with complete yellow vitta on lateral and anterior margins connected to complete or incomplete broad discal vitta (Fig. 321d). Postcoxal line complete in both sexes, area within line smooth, polished, with indistinct, coarse punctures. Male genitalia as in Figure 321a-c.

Discussion. Some of the differences between *H. shauli* and similar species are discussed under *H. oblongus*. In addition, the complete postcoxal line with area inside of the line smooth are characters not shared with *H. oblongus* or *H. ingenuus*.

Type locality. Perryton, Texas.

Type depository. CAS.

Distribution. Figure 320. TEXAS: type locality.

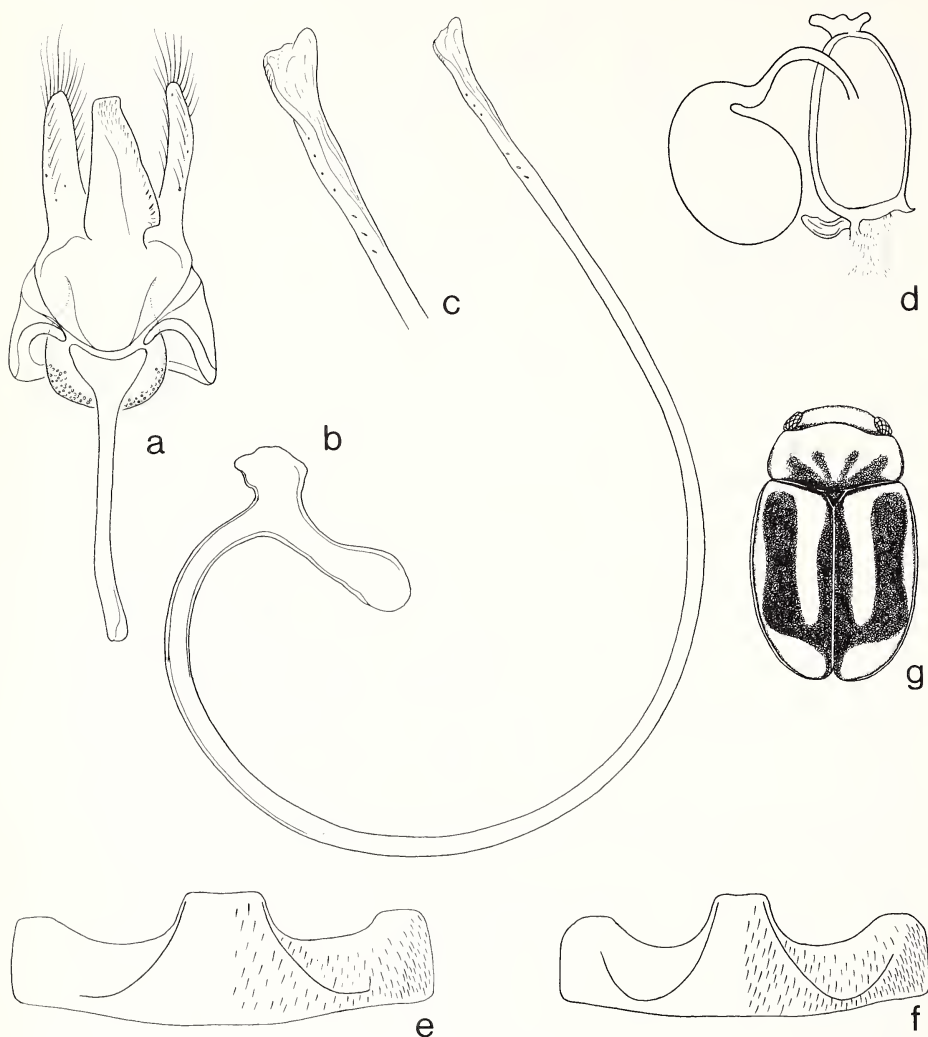


Fig. 322. *Hyperaspidius vittigerus*.

Hyperaspidius vittigerus (LeConte)

Fig. 322a-g; Map, Fig. 320

Hyperaspis vittigera LeConte, 1852, p. 133.—Crotch, 1874b, p. 231.

Hyperaspidius trimaculata: Crotch, 1873, p. 382 (not *trimaculata* L., 1767).

Hyperaspidius vittigera: Leng, 1920, p. 212.—Korschefsky, 1931, p. 200.

Hyperaspidius vittigerus: Wingo, 1952, p. 26.—Belicek, 1976, p. 309.

Diagnosis. Length 1.50 to 2.05 mm, width 1.25 to 1.50 mm. Form oblong, lateral margin of elytron feebly curved. Pronotum of male yellow with black maculation in

basal ; female pronotum dark brown or black, lateral margin narrowly yellow. Elytron black with complete yellow vitta on anterior and lateral borders, discal vitta incomplete or connected to lateral vitta at apex (Fig. 322g). Postcoxal line nearly complete (male) or widely incomplete (female) (Fig. 322e, f), area within line alutaceous, finely, densely punctured. Male genitalia as in Figure 322a–c. Female genitalia as in Figure 322d.

Discussion. The key characters and the differences in male genitalia are the only characteristics I can find to distinguish *H. vittigerus* from *H. hercules* (see comments under *H. hercules*). Superficially *H. vittigerus* resembles *H. mimus* even more than it does *H. hercules*, but *H. vittigerus* and *H. mimus* are in different groups within the genus. LeConte (1852) had more than one type specimen, but only a single male in his collection can now be identified as a type with certainty. I here designate and label this specimen labeled “(green disc)/4656/Type 6725 (red paper)/*H. vittigera* LeC.” as the lectotype.

Type locality. “Missouri Territory” (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 310. ALBERTA: Edmonton; Medicine Hat. COLORADO: El Paso Co., Colorado Springs; Larimer Co., Fort Collins; Weld Co., Pawnee National Grassland; Yuma Co., Wray. IDAHO: St. Anthony sand dunes. MONTANA: Petroleum Co., Winnett; Valley Co., Glasgow. NEW MEXICO: Roswell. NORTH DAKOTA: Grant Co., Lake Tschida. SOUTH DAKOTA: Hutchinson Co., Tripp. WYOMING: Teton Co., Grand Teton Park.

Hyperaspidius hercules Belicek

Fig. 323a–f; Map, Fig. 324

Hyperaspidius hercules Belicek, 1976, p. 308.

Diagnosis. Length 2.10 to 4.0 mm, width 1.50 to 2.20 mm. Form oblong, lateral margin of elytron feebly curved. Pronotum of male yellow with black maculation in basal ; female pronotum black, lateral margin narrowly, obscurely yellow. Elytron black with complete yellow vitta on anterior and lateral borders, discal vitta incomplete or narrowly connected to lateral vitta at apex (Fig. 323e, f). Postcoxal line complete in male, narrowly incomplete in female (Fig. 323d), area within line alutaceous, densely punctured. Male genitalia as in Figure 323a–c.

Discussion. Most specimens of this species are large (more than 3.5 mm long), but a few, usually males, are smaller and these are difficult to distinguish from *vittigerus* without examining the male genitalia. The specimens of typical size are outstanding on that characteristic alone.

Type locality. Medicine Hat, Alberta.

Type depository. CNC.

Distribution. Figure 324. ALBERTA: Medicine Hat. CALIFORNIA: Eureka Valley. COLORADO: Denver Co., Denver. IDAHO: Cassia Co., Burley; Jefferson Co., Terreton; Twin Falls Co., Buhl, Twin Falls. MONTANA: Winnett. NEVADA: Churchill Co., Sand Mountain; Humboldt Co. UTAH: Emery Co., 22 mi. n. Hanksville; Tooele Co., Dugway Proving Ground. WYOMING: Goshen Co., Hell Gap Camp; Laramie Co., Cheyenne; Teton Co., Grand Teton Park.

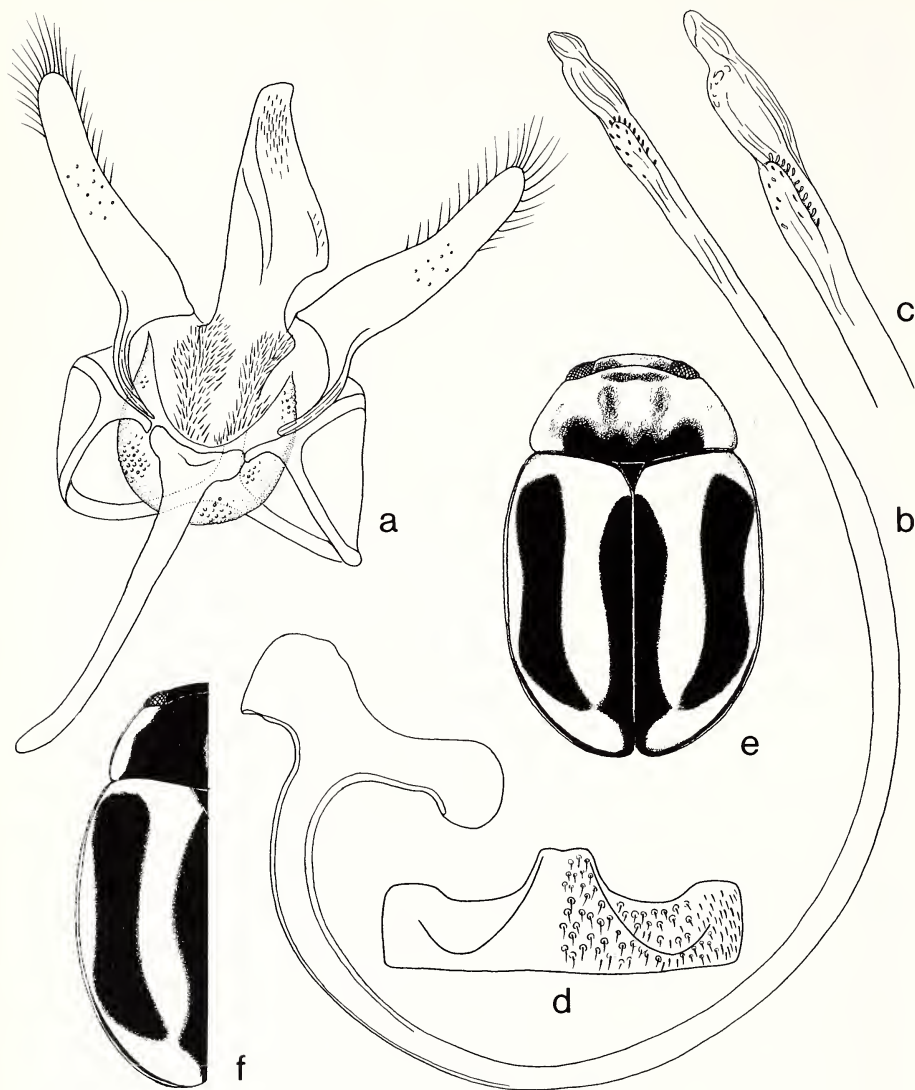


Fig. 323. *Hyperaspidium hercules*.

***Hyperaspidium andrewsi*, new species**

Fig. 325a-e; Map, Fig. 324

Description. Male, length 2.10 mm, width 1.40 mm. Form elongate, slender, narrowed posteriorly, lateral margin of elytron feebly curved. Head and pronotum yellow, pronotum with base narrowly black medially, 4 maculae present in basal 1/4. Elytron yellow with sutural margin narrowly black, narrow, black vitta present me-

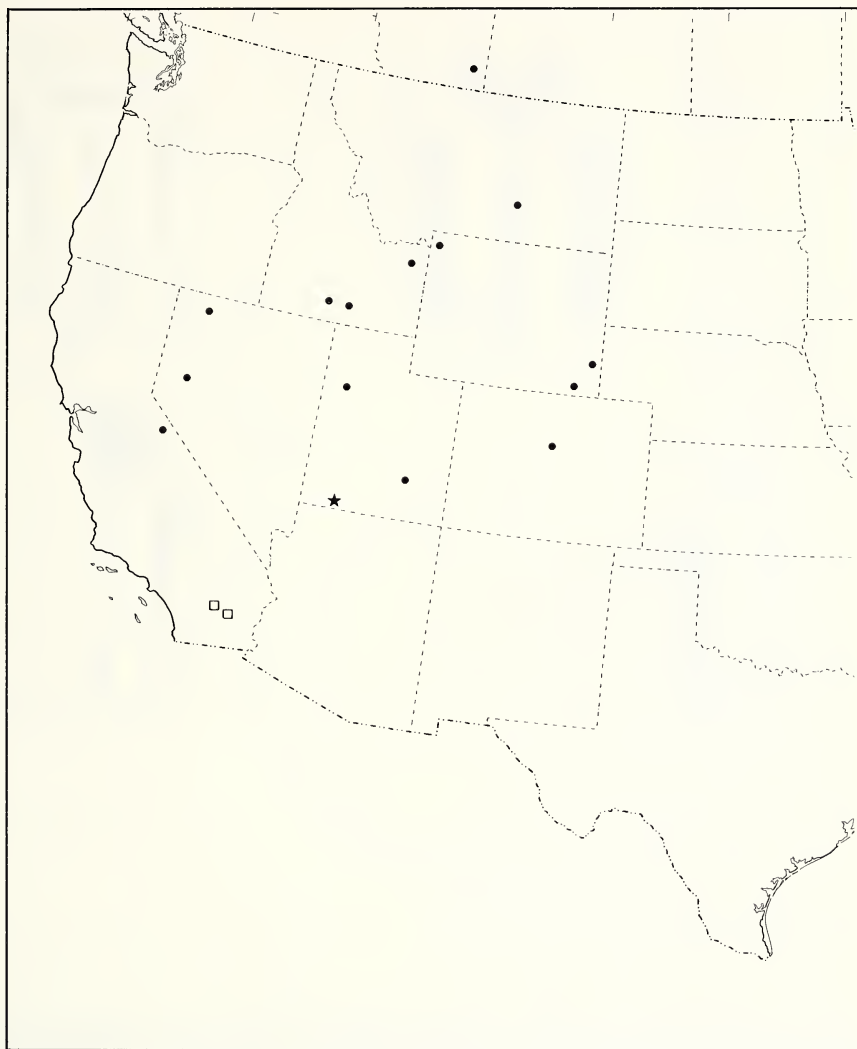


Fig. 324. Distribution. *Hyperaspidius hercules* (dot); *H. andrewsi* (star); *H. hardyi* (square).

dially, widely separated from basal and apical margins (Fig. 325d, e). Punctures on head extremely fine, barely visible; pronotal punctures larger than on head, separated by 2 or 3 times a diameter; surface of elytron dull, reticulate, punctures larger than on pronotum, separated by a diameter or less. Metasternum coarsely, densely punctured laterally, nearly impunctate medially. Abdominal sterna densely, finely punctured; postcoxal line complete, area within line alutaceous, densely punctured; apex of 6th sternum with lateral angle abrupt, emarginate medially. Male genitalia as in Figure 325a-c.

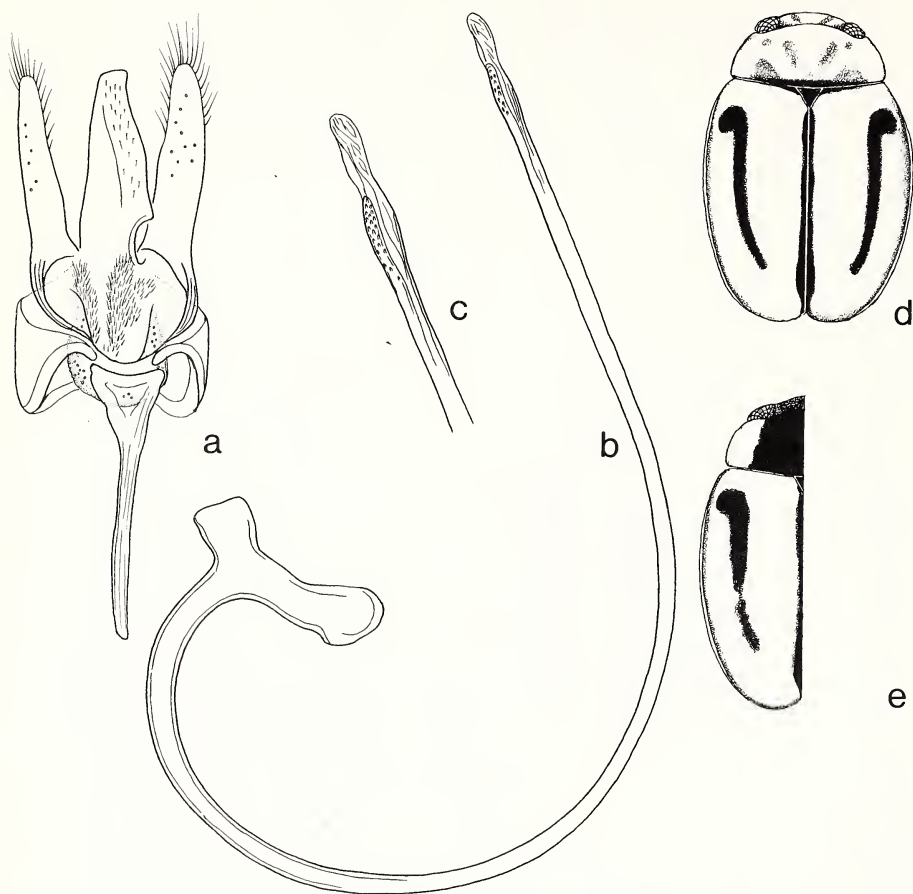


Fig. 325. *Hyperaspidius andrewsi*.

Female, length 2.35 mm, width 1.65 mm. Similar to holotype except head black; pronotum black except lateral $\frac{1}{3}$ and small median spot near apex yellow; 6th abdominal sternum abruptly narrowed toward apex, apex rounded.

Variation. Length 1.80 to 2.65 mm, width 1.20 to 1.80 mm. The male pronotum may lack some or all of the maculae in the basal $\frac{1}{2}$, and the female may have the median pronotal yellow spot either entirely lacking, or expanded to reach apical margin.

Holotype. Male. UTAH: Kane Co., Coral Pink Sand Dunes, VII-16-75, Fred G. Andrews, A. R. Hardy (USNM 101336).

Allotype. Female. Same data as holotype. (USNM).

Paratypes. Total 10 (Fig. 324). All with same data as holotype. (USNM) (CDA).

This species is the most striking and distinctive of all known species of *Hyperaspidius*. The elongate, apically tapered body, straw yellow color, and strongly modified

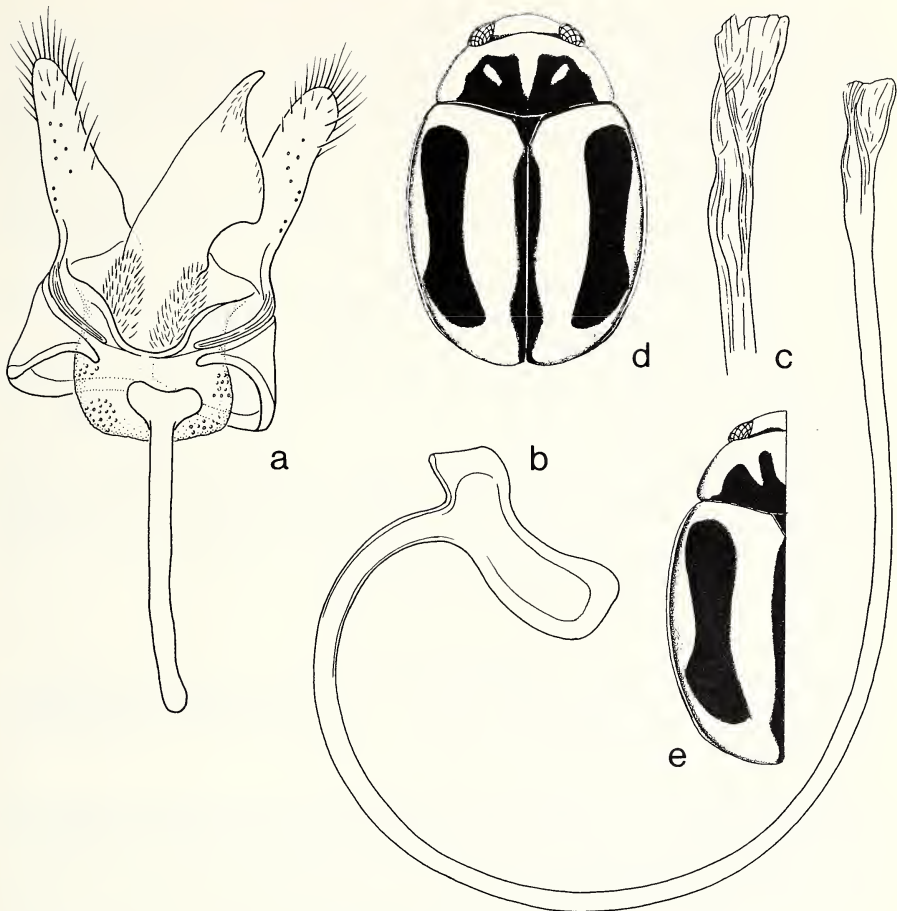


Fig. 326. *Hyperaspidius hardyi*.

6th sternum of both sexes are highly diagnostic. I name the species for one of the collectors of the type series.

Hyperaspidius hardyi, new species
Fig. 326a–e; Map, Fig. 324

Description. Male, length 2.10 mm, width 1.65 mm. Form rounded, convex, lateral margin of elytron definitely curved. Head and pronotum yellow, pronotum with bilobed black area in basal, each lobe with yellow spot present. Elytron yellow, narrow sutural margin and broad median vitta dark brown (Fig. 326d, e). Punctures on head extremely fine, barely perceptible; pronotal punctures larger than on head, separated by one to 3 times a diameter; punctures on elytron equal in size to pronotal punctures except on brown median vitta, there becoming coarse, separated by one

to 3 times a diameter. Metasternum coarsely, densely punctured laterally, nearly impunctate medially. Abdominal sterna coarsely punctured; postcoxal line complete, area within line shiny, polished, densely punctured. Genitalia as in Figure 326a-c.

Female, length 2.20 mm, width 1.75 mm. Similar to holotype except head brownish yellow, vertex dark brown; pronotum dark brown except lateral $\frac{1}{4}$ yellow, midline with faint yellowish brown vitta.

Variation. Length 2.10 to 3.0 mm, width 1.65 to 2.0 mm. The female head may be yellow except vertex black, and the female pronotum may have the black area reduced, as in the male.

Holotype. Male. CALIFORNIA: San Bernardino Co., Cadiz Dunes, IV-25-78, Alan R. Hardy & F. G. Andrews, walking dunes at night (USNM 101337).

Allotype. Female. Same data as holotype. (USNM).

Paratypes. Total 6 (fig. 324). Five with same data as holotype; 1, 6 mi. N Palm Springs Calif., VII-8-54, G. H. Nelson, Snow Creek, on *Ephedra californica*. (USNM) (CDA) (WHN).

This species has the facies of a member of *Hyperaspis* rather than *Hyperaspidius* because of the round, convex body shape. On that basis alone this species is quite distinctive, also, the coarse punctures on the elytron are confined to the median brown vitta, which I have not observed in any other *Hyperaspidius* species. I name this species for one of the collectors of the type series.

Genus *Helesius*

Helesius Casey, 1899, p. 129.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 202.—Chapin, 1966, p. 280. Type-species; *Helesius nubilans* Casey, by subsequent designation of Korschefsky, 1931.

Hyperaspini with body elongate, oval, dorsoventrally convex; dorsal surface glabrous. Head and pronotum red, or head red, pronotum reddish brown; elytron brown or black. Antenna 10-segmented (Fig. 327a); antennal insertion concealed. Eye entire. Scutellum large, wider than long. Epipleuron of elytron narrow, obliquely inclined toward outer margin, strongly excavated for reception of middle and hind femoral apices. Prosternum with 2 parallel carinae not convergent anteriorly. Posterior margin of metasternum abruptly descending between coxa and lateral margin. Leg with femur and tibia compressed, apex of tibia thickened, excavated for reception of tarsal base (Fig. 327b); hind femur extremely broad; tarsal claw without tooth. Postcoxal line on first abdominal sternum incomplete, of *Scymnus* type (Fig. 327c). Apical abdominal sternum of male feebly emarginate. Male genitalia with basal lobe asymmetrical, paramere rooted in phallobase (Fig. 328a). Female genitalia with compound spermathecal capsule (Fig. 327d); coxal plate transverse.

This genus is distinctive in the North American hyperaspine fauna because the legs are compressed and the hind femur is extremely robust. Also, the apex of each tibia is thickened and excavated. The genitalia (male and female) are of the type possessed by the species in Section I of *Hyperaspis*, and *Helesius* is more closely related to *Hyperaspis* than to any other genus of *Hyperaspini*. There are 3 species presently described in *Helesius*, 2 of these are North American and one was described from Colombia.

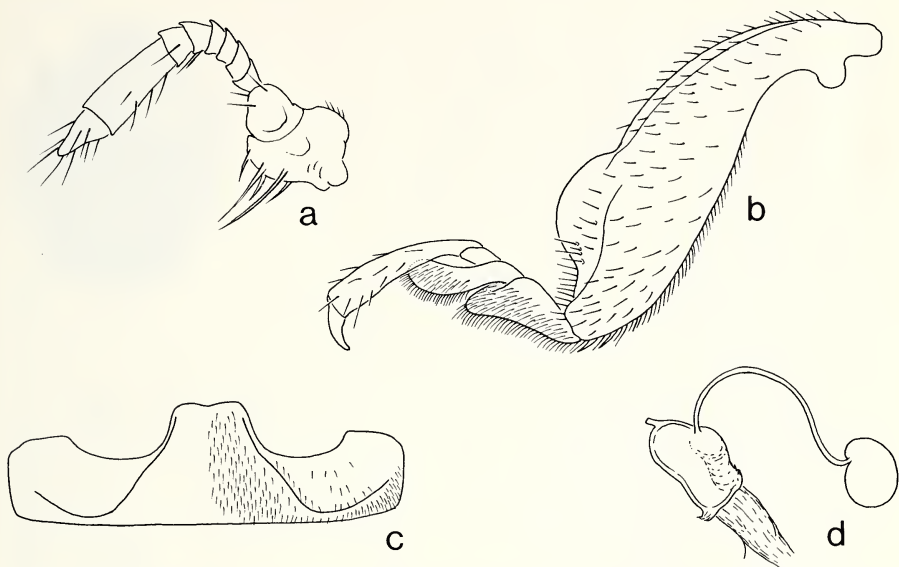


Fig. 327. *Helesius* sp. a. Antenna. b. Front leg. c. Postcoxal line. d. Spermathecal capsule.

A total of 9 specimens have been examined; no host data is on record for any member of this genus.

KEY TO SPECIES OF *Helesius*

1. Punctures on head and elytron dense, Colorado, Montana *nigripennis* (LeConte)
- Punctures on head not apparent, barely perceptible, punctures on elytron fine, indistinct;
Texas *nubilans* Casey

Helesius nigripennis (LeConte)

Fig. 327d; Map, Fig. 329

Scymnus nigripennis LeConte, 1878b, p. 453.

Helesius nigripennis: Casey, 1899, p. 129.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 202.

Diagnosis. Length 2.45 to 3.0 mm, width 1.75 to 2.0 mm. Head red. Pronotum red in lateral $\frac{1}{3}$ with poorly defined reddish brown area medially. Elytron black or dark brown. Female genitalia as in Figure 327d.

Discussion. The type in the LeConte collection labeled “8000 ft., Florissant, Col., Aug. 17–22, 1877/Type 6724(red paper)/*S. nigripennis* Lec./is a *Hyperaspis*”, is a holotype. I have not seen a male of this species.

Type locality. Colorado, Florissant, 8,000 feet.

Type depository. MCZ.

Distribution. Figure 329. COLORADO: Teller Co., Florissant. MONTANA: Lewis and Clark Co., Helena.

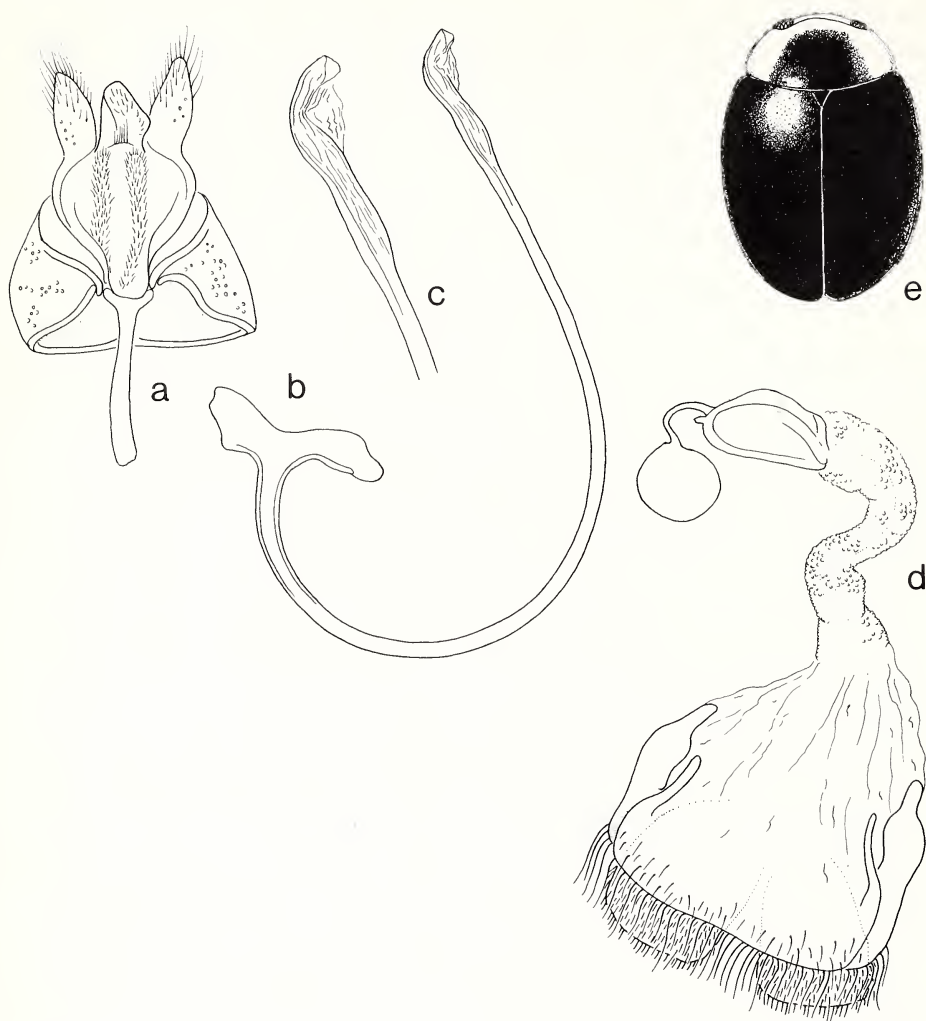


Fig. 328. *Helesius nubilans*.

Helesius nubilans Casey
Fig. 328a-c; Map, Fig. 329

Helesius nubilans Casey, 1899, p. 129.—Leng, 1920, p. 212.—Korschevsky, 1931, p. 202.

Diagnosis. Length 2.80 to 3.0 mm, width 2.10 to 2.25 mm. Head red. Pronotum dark red in lateral $\frac{1}{3}$ with poorly defined reddish brown area medially. Elytron black or dark brown (Fig. 328e). Male genitalia as in Figure 328a-c. Female genitalia as in Figure 328d.

Discussion. All specimens of *H. nubilans* examined, with one exception, have been

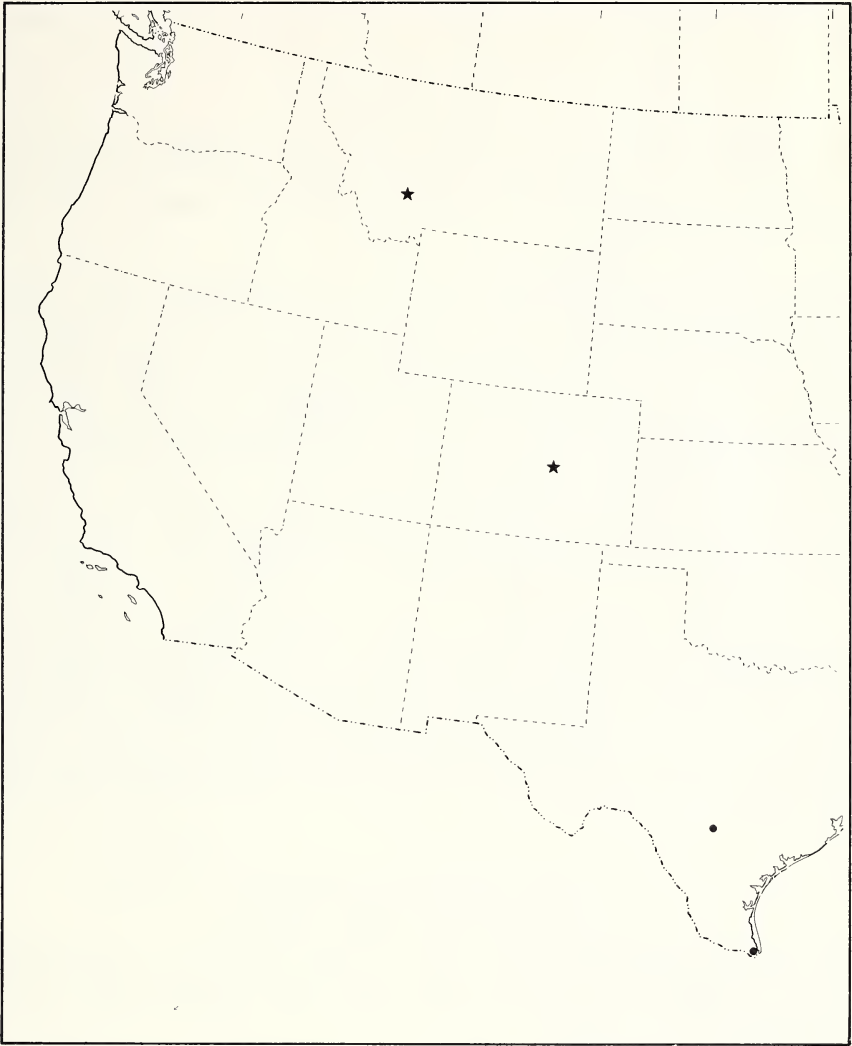


Fig. 329. Distribution. *Helesius nigripennis* (star); *H. nubilans* (dot).

collected in the Brownsville, Texas area. The exception is a female (USNM) from San Antonio, Texas. This specimen has an entirely red pronotum and is larger (3.5 mm long) than normal for *H. nubilans*. There is a good possibility that the specimen represents an undescribed species, but a male is needed to ascertain this. There are 2 female type specimens of *H. nubilans* in the Casey collection, I here designate and label one as the lectotype and the other a paralectotype.

Type locality Brownsville, Texas (lectotype here designated).

Type depository. USNM (35213).

Distribution. Figure 329. TEXAS: Bexar Co., San Antonio; Cameron Co., Brownsville.

Genus *Thalassa*

Thalassa Mulsant, 1850, p. 511.—Crotch, 1874b, p. 209.—Gorham, 1894, p. 182.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 209.—Chapin, 1966, p. 280. Type-species; *Chilocorus pentaspilotus* Chevrolat, by subsequent designation of Crotch, 1874b.

Hyperaspini with body rounded, convex; dorsal surface glabrous. Head yellow in male, black or bluish black in female. Antenna 11-segmented (Fig. 330a); antennal insertion exposed. Eye entire. Epipleuron of elytron wide, strongly descending externally, deeply excavated for reception of middle and hind femoral apices. Prosternum with 2 parallel, incomplete carinae. Posterior margin of metasternum abruptly descending between coxa and lateral margin. Leg compressed, anterior tibia flattened, rounded or angulate at anterior part of outer margin; tarsal claw with large basal tooth (Fig. 330b). Postcoxal line on first abdominal sternum incomplete, of *Scymnus* type (Fig. 330c). Apical abdominal sternum in male feebly emarginate. Male genitalia with basal lobe asymmetrical, paramere rooted in phallobase (Fig. 330d). Female genitalia with compound spermatheca, basal portion with appendix, coxal plate transverse (Fig. 331b).

The only species of this genus known to occur north of Mexico is *Thalassa montezumae* Mulsant, which can be recognized on body form and dorsal color pattern. The primary diagnostic characteristics of the genus as a whole are the strongly descending, deeply foveolate elytral epipleura, and the expanded tibial apices. *Thalassa* is a New World genus containing 6 described species ranging from Arizona and Cuba to Brazil. The only host record seen for *Thalassa* species is the soft scale, *Toumeyella mirabilis* (Cockerell).

Thalassa montezumae Mulsant Fig. 330a–f, 331a, b; Map, Fig. 332

Thalassa montezumae Mulsant, 1850, p. 512.—Crotch, 1873, p. 364.—Crotch, 1874b, p. 209.—Gorham, 1894, p. 183.—Leng, 1903, p. 211.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 209.

Diagnosis. Length 4.50 to 5.80 mm, width 4.0 to 5.0 mm. Form rounded, convex. Male pronotum bluish black with anterior and lateral margins narrowly yellow; female pronotum entirely bluish black except anterolateral angle barely perceptibly yellow. Elytron bluish black with reddish yellow spot in apical (Fig. 331a). Male genitalia as in Figure 330d–f.

Discussion. Two type specimens of *montezumae* exist in the Crotch collection, and I here designate one of these labeled “Mexico/Type/” as the lectotype, the other specimen as a paralectotype.

Type locality. “Mexique” (lectotype here designated).

Type depository. UCCC.

Distribution. Figure 332. ARIZONA: Cochise Co., San Bernardino Ranch; Douglas;

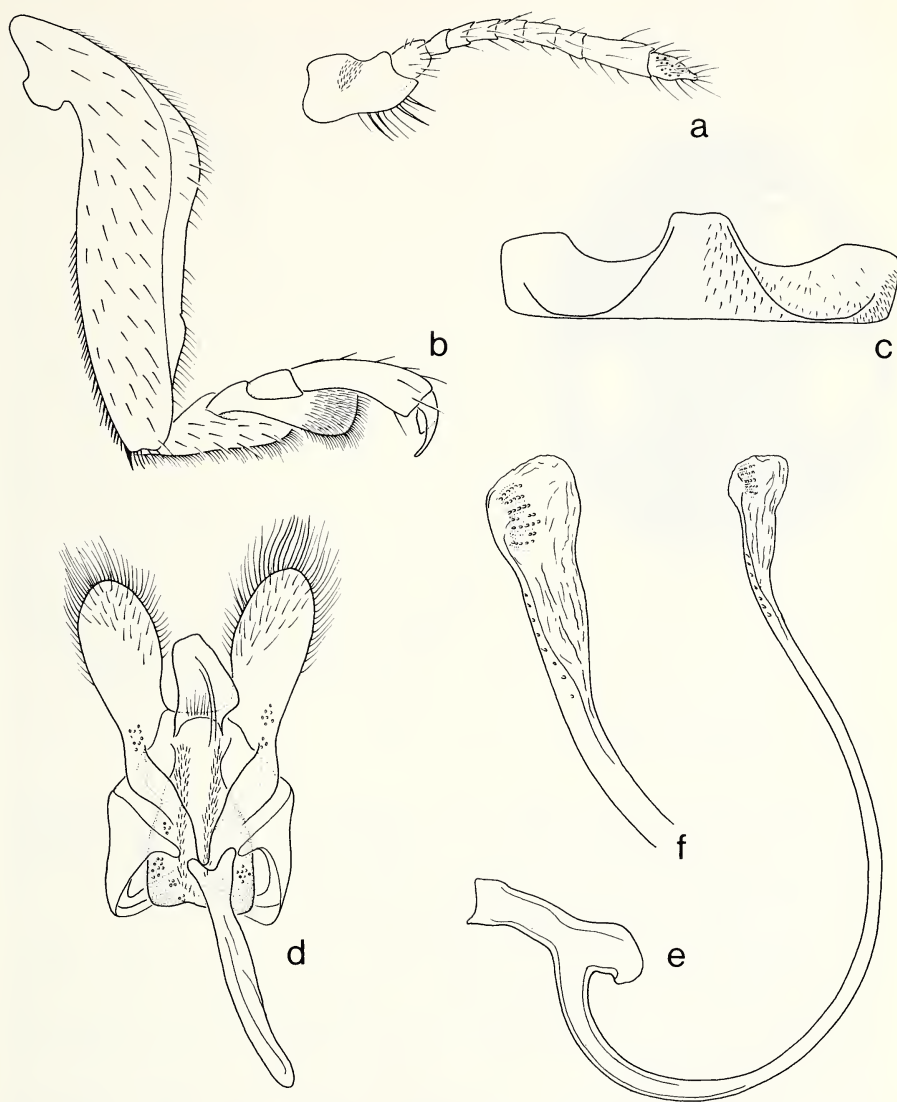


Fig. 330. *Thalassa montezumae*. a. Antenna. b. Front leg. c. Postcoxal line. d-f. Male genitalia.

Graham Mts.; Huachucha Mts.; Oslar; Nogales; Palmerlee; Ruby; Santa Rita Mts.; Tucson; Wilcox. TEXAS: Brownsville; Harlingen.

Genus *Hyperaspis* Redtenbacher

Hyperaspis Redtenbacher, 1844, p. 8.—Mulsant, 1850, p. 649.—Costa, 1849, P. 64.—Crotch, 1873, p. 379.—Crotch, 1874b, p. 224.—Gorham, 1894, p. 191.—Wick-

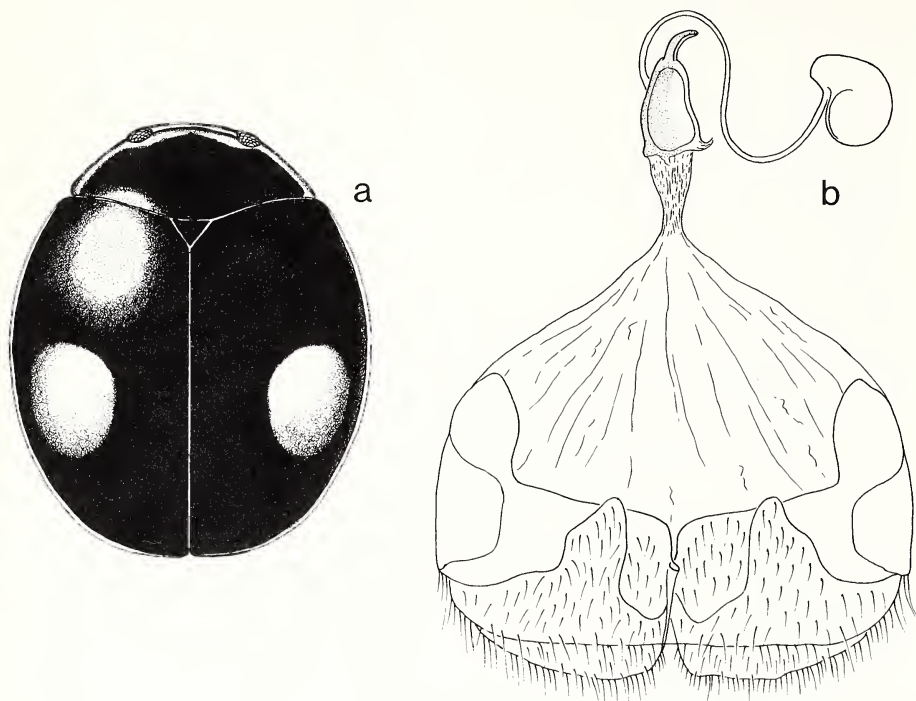


Fig. 331. *Thalassa montezumae*.

ham, 1894, p. 299.—Casey, 1899, p. 120.—Blatchley, 1910, p. 521.—Korschefsky, 1931, p. 177.—Dobzhansky, 1941, p. 1.—Wingo, 1952, p. 17.—Chapin, 1966, p. 280.—J. Chapin, 1974, p. 39.—Belicek, 1976, p. 309. Type-species; *Coccinella reppensis* Herbst, by subsequent designation of Crotch, 1874b.

Oxynychus LeConte, 1850, p. 238.—LeConte, 1852, p. 130.—Mulsant, 1850, p. 649.—Crotch, 1874b, p. 239.—Chapuis, 1876, p. 258.—Weise, 1890, p. 489.—Casey, 1899, p. 116.—Korschefsky, 1931, p. 200.—Dobzhansky, 1941, p. 78.—Bielawski, 1959, p. 54. Type-species; *Oxynychus moerens* LeConte, by monotypy. (Korschefsky, 1931, incorrectly listed *Coccinella erythrocephalus* F. as the type-species of *Oxynychus*.)

Hyperaspis (*Oxynychus*): Mulsant, 1850, p. 694.—Mader, 1955, p. 850.—Miyatake, 1961, p. 154.—Kamiya, 1963, p. 79.

Hyperaspini with form elongate, oval, or rounded, dorsoventrally flattened or hemispherical; dorsum glabrous. Head usually yellow in male, brown or black in female; elytron usually with pale maculation on dark background, rarely immaculate. Antenna 10 or 11-segmented (Fig. 333a, b); antennal insertion exposed. Scutellum large, wider than long. Epipleuron of elytron narrow, not descending externally, often medially grooved, distinctly excavated for reception of middle and hind femoral apices (Fig. 333d). Prosternum with 2 carinae convergent anteriorly (Fig. 333c).



Fig. 332. Distribution. *Thalassa montezumae*.

Posterior margin of metasternum abruptly descending between coxa and lateral margin. Leg with femur and tibia slightly compressed; anterior tibia simple; tarsal claw with or without basal tooth. Postcoxal line on first abdominal sternum incomplete, of *Scymnus* (*Scymnus*) type (Fig. 333e). Apical abdominal sternum in male not or very weakly modified. Male genitalia with median lobe asymmetrical, paramere rooted in phallobase (Fig. 334a). Female genitalia with compound spermathecal capsule (Fig. 334d), basal portion with appendix; coxal plate usually transverse.

Most members of *Hyperaspis* are easily recognized by the key characters, however,

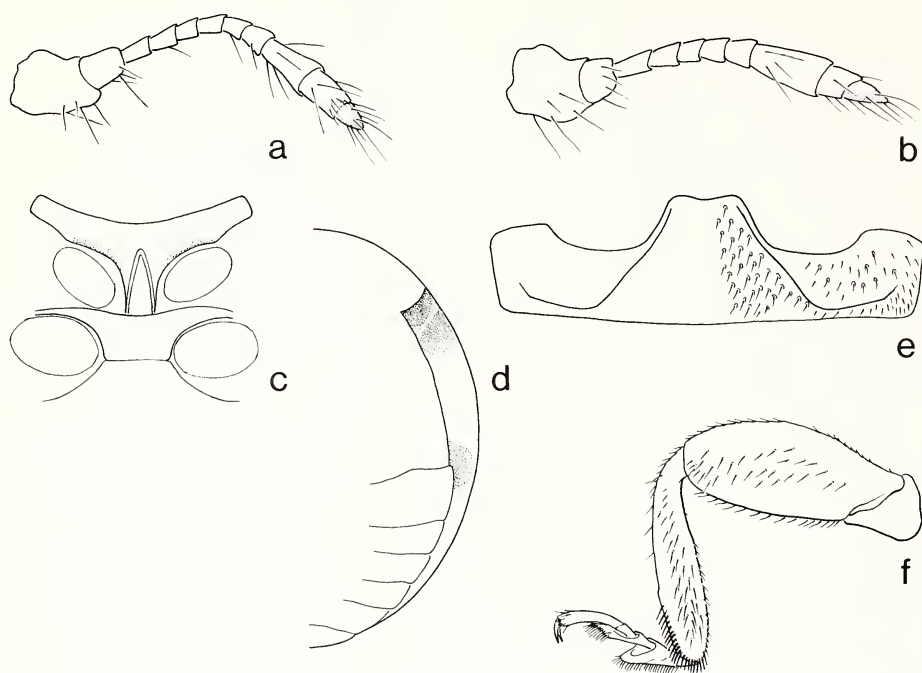


Fig. 333. *Hyperaspis* sp. a, b. Antennae. c. Prosternum. d. Epipleuron. e. Postcoxal lines. f. Front leg.

some of the species have the epipleural excavations reduced, and if not examined closely, may be confused with species of *Hyperaspidius*. *Hyperaspis* is found worldwide, but the bulk of the species of this huge genus are neotropical, with 103 species and subspecies occurring in America north of Mexico.

I have not been able to locate type specimens of *H. horni* Crotch and *H. subsignata* Crotch, nor can their identity be determined from the original description, therefore they must remain unrecognized species. *H. annularis* Boheman does not occur north of Mexico and is here deleted from the list of North American species. Four species formerly placed in *Hyperaspis*, *H. asphaltina* Casey, *H. nubilata* Casey, *H. marginata* Gaines, and *H. tristis* LeConte, are transferred to *Hyperaspidius*. Two species, *H. microsticta* Casey and *H. triplicans* Casey are transferred to *Brachiacantha*. These reassignments are based on examination of primary types.

Host records indicate that species of *Hyperaspis* prey only on families of Homoptera, and that many families within that order serve as hosts; the families Pseudococcidae and Coccidae the most frequently attacked (El-Ali, unpubl. dissertation). Specific host records are as follows: Scale insects; *Amonostherium* (= *Erium*) *lichtensioides* (Cockerell), *Antonina graminis* (Maskell), *Aspidiotus destructor* (Signoret), *Bodenheimeria racheli* (Bodenheimer), *Ceroplastes sinensis* (Del Guercio), *Chrysomphalus aonidum* (Linn), *Coccus hesperidum* (L.), *Coccus pseudomagnoliarum* (Kuwana), *Dactylopius coccus* Costa, *Dactylopius confusus* (Cockerell), *Dactylopius opuntiae*

(Cockerell), *Dactylopius tomentosus* (Lamarck), *Dactylopius* spp., *Dysmicoccus brevipes* (Cockerell), *Dysmicoccus* (= *Pseudococcus*) *boninsis* (Kuwana), *Dysmicoccus* (= *Pseudococcus*) *ryani* (Coquillett), *Eriococcus quercus* (Comstock), *Ferrisia virgata* (Cockerell), *Icerya purchasi* (Maskell), "*Inglisia*" *malvacearum* (Cockerell), *Lecanium* spp., *Lepidosaphes beekii* (Newman), *Maconellicoccus* (= *Phenacoccus*) *hirsutus* (Green), *Mesolecanium nigrofasciatum* (Pergande), *Metacaronema japonica* (Maskell), *Neopulvinaria ineretina* (Khazhibeili), *Nipaecoccus* (= *Pseudococcus*) *aurilana-tus* (Maskell), *Nipaecoccus* (= *Pseudococcus*) *filamentosus* (Cockerell), *Nipaecoccus* (= *Pseudococcus*) *nipae* (Maskell), *Orthezia artemisiae* (Cockerell), *Orthezia urticae* (Linn), *Orthezia* spp., *Parthenolecanium corni* (Bouche), *Phenacoccus acericola* (King), *Phenacoccus colemani* (Ehrhorn), *Phenacoccus gossypii* (Townsend and Cockerell), *Phenacoccus helianthi* (Cockerell), *Phenacoccus pergandei* (Cockerell), *Physokermes insignicola* (Craw), *Planococcus* (= *Pseudococcus*) *citri* (Risso), *Planococcus kenya*e (LePelly), *Planococcus lilacinus* (Cockerell), *Protopulvinaria fukayai* (Kuwana), *Protopulvinaria pyriformis* (Cockerell), *Pseudococcus calceolariae* (Maskell), *Pseudococcus citriculus* (Green), *Pseudococcus comstocki* (Kuwana), *Pseudococcus longispinus* (Targioni-Tozzetti), *Pseudococcus maritimus* (Ehrhorn), *Pseudococcus* spp., *Pulvinaria acericola* (Walsh and Riley), *Pulvinaria aurantii* (Cockerell), *Pulvinaria citricola* (Kuwana), *Pulvinaria floccifera* (Westwood), *Pulvinaria hazae* Kuwana, *Pulvinaria hydrangeae* (Steinweden), *Pulvinaria innumerabilis* (Rathvon), *Pulvinaria torreyae* (Takahashi), *Pulvinaria vitis* (L.), *Pulvinaria* spp., *Puto* (= *Pseudococcus*) *yuccae* (Coquillett), *Ripersia* sp., *Saccharicoccus* (= *Pseudococcus*) *sacchari* (Cockerell), *Saccharicoccus* (= *Trionymus*) *sacchari*, *Selenaspidus* (= *Pseudaonidia*) *articulatus* (Morgan), *Sphaerolecanium prunastri* (Boyer de Fonscolombe), *Spilococcus* (= *Pseudococcus*) *sequoiae* (Coleman), *Takahashia japonica* (Cockerell), *Toumeyella liriodendri* (Gmelin), *Toumeyella mirabilis* (Cockerell), *Toumeyella parvicornis* (Cockerell), *Toumeyella pini* (King), *Toumeyella pinicola* (Ferris), *Trionymus insularis* (Ehrhorn), *Unaspis citri* (Comstock). Aphids; *Aphis craccivora* Koch, *Aphis fabae* (Scopoli), *Aphis gossypii* Glover, *Aphis nerii* Boyer de Fonscolombe, *Aphis pomi* Degeer, *Cryptosiphum artemisiae* (Buckton), *Cryptosiphum gallarum* (Kaltenbach), *Macrosiphum euphorbiae* (Thomas), *Melanaphis sacchari* (Zehntner), *Myzus malisuctus* (Matsumura), *Rhopalosiphum maidis* (Fitch), *Schizaphis graminum* (Rondani), *Sipha flava* (Forbes), *Toxoptera citricidus* (Kirkaldy).

The North American species of *Hyperaspis* were taxonomically treated by Dobzhansky (1941), and the California species were recently the object of an excellent dissertation (unpubl.) by El-Ali at the University of California, Berkeley. I have made extensive use of El-Ali's findings in preparing this section on *Hyperaspis*.

El-Ali was the first to realize that species of *Hyperaspis* possessed both 10 and 11-segmented antennae, and he based his first major species grouping on this. He then proceeded to define 19 minor groupings, modifying to a great extent Dobzhansky's (1941) grouping. The groups I recognize here differ to some extent from those of El-Ali, principally for the following reasons: (1) El-Ali did not have available to him many of the eastern species of *Hyperaspis*, and on examining these I find that some of the criteria he used for group definition are rendered useless because a species often possesses the external characteristics of one group and the internal characteristics of another; (2) I believe that this type of informal grouping can be justified only

as long as it serves a practical purpose, therefore, I have combined many of El-Ali's groups because the definitions were tenuous, making them difficult to recognize and use. The major division based on 11-segmented or 10-segmented antennae is certainly a valid one, and I refer to these as Section I and Section II, respectively. Within each of these there are several groups based mainly on the type of genitalia and somewhat on the body shape and color pattern.

KEY TO SPECIES OF *Hyperaspis*

1. Antenna 11-segmented 2
- Antenna 10-segmented 53
- 2(1). Elytron with basal spot near scutellum (Fig. 373d), spot sometimes connected to discal spot (Fig. 379) 3
- Elytron without basal spot near scutellum 7
- 3(2). Elytron with 4 or 5 spots 4
- Elytron with less than 4 spots, often appearing vittate 5
- 4(3). Pronotum mostly black, lateral border and/or anterior border yellow (Fig. 373d) *levrati* Mulsant
- Pronotum yellow with irregular, median dark area (Fig. 395e) *longicoxitis* Nutting
- 5(3). Elytron with irregular median vitta (connected spots) from base to apex (Fig. 382d); known only from Mississippi *esclavium* Dobzhansky
- Elytron not as described above; species occurring west of the Mississippi River 6
- 6(5). Basal spot on elytron large, elongate oval, often connected to apical spot, discal spot absent (Fig. 393d, e) *fastidiosa* Casey
- Basal spot on elytron small, often narrowly connected to small discal spot, discal spot often absent (Fig. 379d, e) *revocans* Casey
- 7(2). Elytron entirely black or brown, immaculate: California *pluto* Fall
- Elytron always with maculation; California and elsewhere 8
- 8(7). Elytron entirely red except narrow lateral border and broad basal border black (Fig. 353d); known only from Florida *nigrosuturalis* Blatchley
- Elytron not as described above; Florida and elsewhere 9
- 9(8). Elytron with humeral spot or with lateral vitta beginning at humeral angle .. 10
- Elytron without humeral spot or vitta 15
- 10(9). Elytron with lateral vitta extending from humeral angle beyond midpoint ... 11
- Elytron with humeral spot or short vitta not extending beyond midpoint 12
- 11(10). Surface of elytron dull, alutaceous; male pronotum almost entirely yellowish red; discal and apical spots on elytron not connected *lugubris* (Randall)
- Surface of elytron shiny; male pronotum mostly black, or yellow with irregular, median black area; discal and apical spots on elytron often connected, lateral vitta often extending to apical spot (Fig. 393d, e) *fastidiosa* Casey
- 12(10). Elytron with 4 yellow spots, discal spot with anterior border emarginate (Fig. 347d) *octonotata* Casey
- Elytron with no more than 3 red or yellow spots, discal spot not emarginate (often absent) 13
- 13(12). Discal spot on elytron broadly connected to lateral spot (Fig. 368d) .. *excelsa* Fall
- Discal spot on elytron present or absent, if present then not connected to lateral spot (Fig. 365e, 367d) 14
- 14(13). Female pronotum entirely black; male pronotum narrowly yellow on lateral and apical margin (Fig. 365e) *lateralis* Mulsant

- Female pronotum with yellow spot on lateral margin; male pronotum broadly yellow laterally, narrowly yellow apically (Fig. 367d) *pinguis* Casey
- 15(9). Apex of clypeus truncate elytron with 2 small, apical spots, usually confluent (Fig. 356d); coastal localities from Virginia to Georgia *gemina* LeConte
- Apex of clypeus emarginate; elytron not as described above; not restricted to eastern coastal localities 16
- 16(15). Body form nearly rectangular, elongate; elytron with large, median yellow spot extending from lateral margin nearly to suture (Fig. 364d) eastern United States *lewisi* Crotch
- Body form oval or rounded, if somewhat rectangular then not from eastern U.S.; pattern on elytron not as described above; eastern United States and elsewhere 17
- 17(16). Elytron with 3 spots, one discal, one on lateral margin at or just posterior to midpoint, one at apex (Figs. 374d) 18
- Elytron with one to 4 spots, if 3 spots present, then not arranged as described above 24
- 18(17). Species not known to occur west or south of Kansas and Missouri 19
- Species known only from Texas, New Mexico and Arizona 20
- 19(18). Body form extremely convex, rounded (Fig. 374d); New England to Minnesota, Kansas, and Missouri *deludens*, n. sp.
- Body form elongate, oblong (Fig. 376); known only from “Missouri” and New Jersey *pratensis* LeConte
- 20(18). Species occurring in Texas *medialis* Casey
- Species occurring in Arizona and New Mexico 21
- 21(20). Lateral spot on elytron posterior to middle (Fig. 381d) *triangulum* Casey
- Lateral spot on elytron at middle (Fig. 392d) 22
- 22(21). Male pronotum with anterior margin black medially (Fig. 392d); length 1.90 to 2.30 mm *conspirans* Casey
- Male pronotum with anterior margin yellow medially, length 2.20 to 2.80 mm 23
- 23(22). Form oval, not strongly convex; apical spot on elytron heart shaped (Fig. 391d) *gemma* Casey
- Form rounded, strongly convex; apical spot on elytron round (Fig. 378d) ... *aemulator* Casey
- 24(17). Elytron with single apical spot (Fig. 357e) *bigeminata* (Randall)
- Elytron with one or more spots, if only one spot present, then not located at apex 25
- 25(24). Elytron with large, marginal red spot enclosing small yellow spot, and single apical spot (Fig. 385d), apical spot may be absent, Utah *uteana*, n. sp.
- Elytron not as described above; Utah and elsewhere 26
- 26(25). Elytron with 2 small spots, one at apex, one on lateral margin in apical $\frac{1}{3}$ (Fig. 372e) *chapini* Dobzhansky
- Elytron not as described above 27
- 27(26). Elytron with 4 spots (Fig. 335a); Brownsville, Texas *weisei* Schaeffer
- Elytron not as described above 28
- 28(27). Elytron with discal spot and 2 apical spots (Fig. 334e) *proba* (Say)
- Elytron not as described above 29
- 29(28). Elytron with irregular median vitta extending from base to apex (Fig. 382d); known only from Mississippi *esclavium* Dobzhansky
- Elytron not as described above; Mississippi and elsewhere 30

- 30(29). Elytron with single yellow spot on lateral margin in apical $\frac{1}{2}$, spot often narrowly elongated posteriorly (Fig. 383e); California *osculans* LeConte
 – Elytron not as described above; California and elsewhere 31
- 31(30). Elytron with 2 spots, one discal, one apical 32
 – Elytron with single spot in discal area or apical $\frac{1}{2}$, spot may be greatly expanded 37
- 32(31). Species occurring only in California 33
 – Species not occurring in California 34
- 33(32). Body form convex, rounded (Fig. 386d); anterior pronotal margin of male black *mckenziei* Nutting
 – Body form broad, depressed (Fig. 341d); anterior pronotal margin of male yellow *jovialis* Fall
- 34(32). Body form very elongate, oval (Fig. 345d); mountains of northern New Mexico *haematosticta* Fall
 – Body form rounded; not known from New Mexico 35
- 35(34). Body of female dorsoventrally flattened; basal lobe of male genitalia with lateral projection on left side in ventral view (Fig. 354a) *conviva* Casey
 – Body of female not dorsoventrally flattened; basal lobe of male genitalia with lateral projection on right side in ventral view 36
- 36(35). Basal lobe of male genitalia not strongly asymmetrical, apex rounded (Fig. 351a) *pistillata* Watson
 – Basal lobe of male genitalia strongly asymmetrical, apex truncate (Figs. 348a) *signata signata* (Olivier)
- 37(31). Species known only from California 38
 – Species not occurring in California 39
- 38(37). Spot on elytron distinctly separated from lateral margin, often with small, subapical black spot enclosed (Fig. 341d) *jovialis* Fall
 – Spot on elytron touching or very narrowly separated from lateral margin (Fig. 342e) *leachi* Nunenmacher
- 39(37). Anterior margin of prosternum crenate southern Arizona *oculifera* Casey
 – Anterior margin of prosternum smooth; Arizona and elsewhere 40
- 40(39). Spot on elytron located in apical $\frac{1}{2}$ near apical margin (Fig. 370d); Florida *ornatella*, n. sp.
 – Spot on elytron located in discal area, or if in apical $\frac{1}{2}$, then not approaching apical margin; Florida and elsewhere 41
- 41(40). Species known only from Arizona *tuckeri* Casey
 – Species not occurring in Arizona 42
- 42(41). Body form very elongate, oval (Fig. 345a); mountains of northern New Mexico *haematosticta* Fall
 – Body form not extremely elongate; not known to occur in New Mexico 43
- 43(42). Length 2.0 mm or less; body extremely convex, rounded (Fig. 338e); Brownsville, Texas *globula* Casey
 – Length more than 2.0 mm; body not as described above; Texas and elsewhere 44
- 44(43). Species known only from Texas 45
 – Species not occurring in Texas 46
- 45(44). Discal spot on elytron posterior to middle (Fig. 359d) *wickhami* Casey
 – Discal spot on elytron on middle of disc *signata bicentralis* Casey
- 46(44). Female pronotum with yellow area on lateral margin; male pronotum with lateral yellow area occupying $\frac{1}{2}$ or more of pronotum 47

- Female pronotum entirely black; male pronotum with lateral yellow area occupying $\frac{1}{8}$ or less of pronotum (except *concaus* male) 48
- 47(46). Discal spot on elytron on middle of disc, sometimes extended posteriorly (Fig. 337d) *rivularis* Dobzhansky
- Discal spot on elytron posterior to middle (Fig. 346d), occasionally greatly enlarged *inedita* Mulsant
- 48(46). Body of female dorsoventrally flattened; basal lobe of male genitalia with lateral projection on left side in ventral view (Fig. 354a) *conviva* Casey
- Body of female not dorsoventrally flattened; basal lobe of male genitalia with lateral projection on right side in ventral view, or lacking lateral projection . 49
- 49(48). Basal lobe of male genitalia with apical angles rounded (Fig. 351a) *pistillata* Watson
- Basal lobe of male genitalia not as figured above 50
- 50(49). Paramere of male genitalia short, spatulate (Fig. 361a) 51
- Paramere of male genitalia long, slender, not spatulate 52
- 51(50). Pronotum of male with anterolateral angle and apical margin broadly yellow (Fig. 361a) *concaus* Watson
- Pronotum of male narrowly yellow on lateral and apical margins (Fig. 360d) *major* Dobzhansky
- 52(50). Basal lobe of male genitalia slender, not strongly asymmetrical (Fig. 343a) . . *binotata* (Say)
- Basal lobe of male genitalia broad, strongly asymmetrical (Fig. 348a) *signata signata* (Olivier)
- 53(11). Head entirely pubescent 54
- Head glabrous except often with sparse pubescence on apical border of clypeus 55
- 54(53). Elytron immaculate, or with lateral spot not extending forward to humeral angle (Fig. 396e); Arizona, Utah, southern California *significans* Casey
- Elytron always maculate, with the lateral spot usually extending forward to humeral angle; Texas, New Mexico *cruenta* LeConte
- 55(53). Pronotum in both sexes with lateral yellow area large, more than $\frac{3}{5}$ wider than long; elytron with 2 spots, discal and apical, connected or not, apical spot almost reaches hind margin of elytron 56
- Pronotum entirely black or with lateral yellow area twice as long as wide, if less than twice as long as wide, then elytron not as described above 58
- 56(55). Elytron with discal and apical spots connected (Fig. 387e) . *connectens* (Thunberg)
- Elytron with discal and apical spots not connected 57
- 57(56). Apical spot on elytron not approaching suture (Fig. 388e); Texas . . *rotunda* Casey
- Apical spot on elytron reaching suture or nearly so (Fig. 390d); Arizona *dobzhanskyi*, n. sp.
- 58(55). Elytron immaculate 59
- Elytron with at least one spot or vitta 64
- 59(58). Species occurring in the southeastern United States 60
- Species occurring west of the Mississippi River 61
- 60(59). Body elongate, somewhat flattened; male pronotum with lateral $\frac{1}{4}$ yellow (Fig. 410d) *uniformis* Casey
- Body oval, not distinctly flattened; male pronotum narrowly yellow on lateral margin *binaria* Casey
- 61(59). Head black in both sexes; pronotum entirely black in both sexes; body slender, elongate (fig. 454d); Alberta, Colorado, Wyoming *jasperensis* Belicek

- Head yellow in male; male pronotum narrowly yellow laterally; body oval; not known from northern Rocky Mountains 62
- 62(61). Body dorsoventrally depressed, elongate oval (Fig. 452d); epipleuron not deeply excavated for femoral apices; Arizona, Nevada *simulans* Casey
- Body convex, rounded; epipleuron deeply excavated for femoral apices; Arizona, Nevada, and elsewhere 63
- 63(62). Pronotum narrowly yellow laterally in both sexes; western Washington and Oregon *immaculata* Hatch
- Pronotum black in female, narrowly yellow on lateral margin in male; not known from western Washington and Oregon *pleuralis* Casey
- 64(58). Dorsal surface strongly alutaceous; elytron with postdiscal spot broadly connected to complete lateral vitta (Fig. 456d); Illinois, Indiana, Kansas *bolteri* LeConte
- Species not as described above, or if so, then not occurring east of the Mississippi River 65
- 65(64). Elytron with marginal vitta extending from near scutellum around humeral angle to apex, small, elongate discal spot present, often expanded posteriorly to join marginal vitta (Fig. 457d-i); Texas, Arizona *trifurcata* Schaeffer
- Elytron not as described above; Texas and elsewhere 66
- 66(65). Elytron with one basal spot in addition to lateral vitta or humeral spot 67
- Elytron without basal spot, with or without lateral vitta or humeral spot 69
- 67(66). Elytron with discal vitta (Fig. 443d) *consimilis* LeConte
- Elytron with postdiscal spot 68
- 68(67). Basal spot on elytron triangular, nearer humeral spot or lateral vitta than scutellum (Fig. 435d) *disconotata* Mulsant
- Basal spot on elytron round, nearer scutellum than humeral spot (Fig. 437d) *troglodytes* Mulsant
- 69(66). Elytron vittate in appearance, one discal and one marginal vitta present 70
- Elytron not appearing vittate 74
- 70(69). Dorsal surface dull, strongly alutaceous; Illinois, Indiana *brunnescens* Dobzhansky
- Dorsal surface shiny, lacking alutaceous sculpture; Iowa and west 71
- 71(70). Elytron with discal and marginal vitta usually broadly joined at apex (Fig. 428d); California *annexa* LeConte
- Elytron with discal and marginal vittae not joined apically, or very narrowly so; not known from California 72
- 72(71). Male pronotum black on anterior margin; occurring from Idaho east to Iowa, south to New Mexico *quadrivittata* LeConte
- Male pronotum yellow on anterior margin; Idaho, Washington, Oregon, northern California 73
- 73(72). Basal lobe of male genitalia bisinuate on sclerotized side (Fig. 442a) occurring principally from the Cascade Mountains to the Pacific Coast *borealis* Dobzhansky
- Basal lobe of male genitalia not bisinuate, emarginate in apical ' on sclerotized side (Fig. 434a); occurring principally east of the Cascade Mountains *oregona* Dobzhansky
- 74(69). Color pattern on elytron consisting only of complete vitta on lateral margin . 75
- Color pattern on elytron with or without complete vitta on lateral margin, if vitta present, then additional maculation also present 81
- 75(74). Pronotum impunctate, surface dull, strongly alutaceous; marginal vitta on ely-

- tron $\frac{1}{4}$ or less the width of elytron; Pennsylvania to Florida, Mississippi *fimbriolata* Melsheimer
- Pronotum punctate, surface usually shiny, not strongly alutaceous; not confined to Atlantic and Gulf coast seabords 76
- 76(75). Body form elongate, nearly parallel sided; apex of lateral vitta on elytron strongly separated from margin (Fig. 449d); Arizona *protensa* Casey
- Body form oval or rounded; apex of lateral vitta on elytron narrowly separated from margin, if strongly separated then not occurring in Arizona; Arizona and elsewhere 77
- 77(76). Elytron with vitta usually occupying $\frac{1}{2}$ of elytron at midpoint (Fig. 442d); California *cincta* LeConte
- Elytron with vitta occupying $\frac{1}{3}$ or less of elytron at midpoint; California and elsewhere 78
- 78(77). Basal lobe of male genitalia slender, rounded at apex, lateral projection rounded (Fig. 398a); Santa Rita Mountains, Arizona *sanctaeritae* Dobzhansky
- Basal lobe of male genitalia broad, apex acute, lateral projection not as figured above; Arizona and elsewhere 79
- 79(78). Basal lobe of male genitalia with lateral projection near apex, blunt (Fig. 401a) *inflexa* Casey
- Basal lobe of male genitalia with lateral projection near midpoint, rounded (Fig. 403a) 80
- 80(79). Body form depressed dorsoventrally; marginal vitta on elytron occupying $\frac{1}{4}$ of elytron, apex strongly separated from margin of elytron (Fig. 406d); known only from San Diego, California *limbalis* Casey
- Body form convex; marginal vitta on elytron occupying $\frac{1}{3}$ of elytron, apex narrowly separated from margin of elytron (Fig. 403d); not known from San Diego *caseyi*, n. sp.
- 81(74). Species with single spot or short vitta on lateral margin of elytron in basal $\frac{2}{3}$, spot never extended onto disc 82
- Species with one or more spots on elytron, if only one, then in apical $\frac{1}{3}$ or extended onto disc from lateral margin 86
- 82(81). Species occurring in southeastern United States *binaria* Casey
- Species occurring west of the Mississippi River 83
- 83(82). Elytron with lateral vitta extending from humeral angle beyond midpoint 84
- Elytron with spot at humeral angle or at midpoint 85
- 84(83). Species occurring in southern Texas *schaefferi*, n. sp.
- Species occurring west and north of New Mexico *dissoluta nevadica* Casey
- 85(83). Body form convex, apex slightly truncate; elytron with spot slightly posterior to midpoint, (Fig. 413e) *pleuralis* Casey
- Body form flattened dorsoventrally; elytron with spot slightly posterior to midpoint, or with very narrow, elongate spot at humeral angle *simulans* Casey
- 86(81). Large robust species; elytron with triangular humeral spot and spot at apex (Fig. 421d) *nunenmacheri* Casey
- Species not as described above 87
- 87(86). Elytron with marginal vitta from humeral angle beyond midpoint, and apical spot 88
- Elytron not maculate as described above 90
- 88(87). Female pronotum entirely black; male genitalia with strong lateral projection in basal (Fig. 419a) *dissoluta dissoluta* Crotch
- Female pronotum with lateral margin narrowly yellow 89

- 89(88). Basal lobe of male genitalia bisinuate on sclerotized side (Fig. 442a) *borealis* Dobzhansky
 – Basal lobe of male genitalia not bisinuate, emarginate in apical ' on sclerotized side (Fig. 434a) *oregona* Dobzhansky
- 90(87). Elytron with single spot on apical $\frac{1}{3}$, may extend onto apical ' (also see *sene-galensis hottentota*) 91
 – Elytron with more than one macula or spot not on apical $\frac{1}{3}$ 95
- 91(90). Spot on elytron obliquely elongate, near suture (Fig. 448); occurring in Great Lakes region *moerens* LeConte
 – Spot on elytron not obliquely elongate; occurring west of the Mississippi River 92
- 92(91). Spot on elytron large, extending onto apical ', nearer lateral margin than suture (Fig. 429d); Arizona *arizonica* Dobzhansky
 – Spot on elytron small, not extending onto apical ' ; not occurring in Arizona 93
- 93(92). Spot on elytron narrow, elongate, nearer suture than apical margin of elytron *borealis* Dobzhansky
 – Spot on elytron rounded or wedge-shaped, very near apical margin of elytron, distinctly removed from suture (Fig. 431d) 94
- 94(93). Length 2.40 mm or less; spot on elytron less than 2 times as far from suture as from apical margin (Fig. 431d); basal lobe of male genitalia not longer than paramere (Fig. 431a) *oculaticauda* Casey
 – Length 2.30 mm or more; spot on elytron usually more than 2 times as far from suture as from apical margin (Fig. 423e); basal lobe of male genitalia longer than paramere (Fig. 423a) *postica* LeConte
- 95(90). Discal spot on elytron broadly connected to lateral vitta or marginal spot (Fig. 417d, g) 96
 – Discal spot on elytron absent, or if present, then discrete 97
- 96(95). Female pronotum black; surface of pronotum shiny; elytron with fine, indistinct punctures, lateral vitta extending from humeral angle to just beyond midpoint (Fig. 417e), or extending to apex of elytron (Fig. 417g), or interrupted just before apex, leaving apical spot free *taeniata* LeConte
 – Female pronotum yellow on lateral margin; surface of pronotum dull with apparent alutaceous sculpture; elytron with coarse, dense punctures, lateral yellow area not extending to humeral angle, or very narrowly so (Fig. 426e) *quadrioculata* (Motschulsky)
- 97(95). Elytron without discal spot 98
 – Elytron with discrete discal spot 102
- 98(97). Elytron with large, oblong apical spot very near apical margin, and one small spot on lateral margin (Fig. 433d) *querquesi* Nutting
 – Elytron with spot pattern not exactly as described above 99
- 99(98). Elytron with 3 discrete marginal spots, humeral spot large, triangular (Fig. 433d) 100
 – Elytron with marginal vitta or with 2 or 3 marginal spots, if with 3 spots, then humeral spot reduced to narrow, elongate streak 101
- 100(99). Female pronotum entirely black; male pronotum with yellow area on lateral margin not extending to posterolateral angle *psyche* Casey
 – Female pronotum yellow on lateral margin; male pronotum with yellow area on lateral margin extending to posterolateral angle (Fig. 426d) *quadrioculata* (Motschulsky)
- 101(99). Basal lobe of male genitalia bisinuate on sclerotized side (Fig. 442a) *borealis* Dobzhansky

- Basal lobe of male genitalia not bisinuate, emarginate in apical $\frac{1}{3}$ on sclerotized side (Fig. 434a) *oregona* Dobzhansky
- 102(97). Humeral angle of elytron black 103
- Humeral angle of elytron yellow 104
- 103(102). Discal spot on elytron wedge-shaped, large lateral spot present medially (Fig. 445d); body flattened dorsoventrally *spiculinata* Fall
- Discal spot on elytron rounded or elongate, lateral spot absent or extremely reduced (Fig. 426d); body not flattened *quadrioculata* (Motschulsky)
- 104(102). Body form slender, nearly parallel sided (Fig. 441d) 105
- Body form oval or rounded (Fig. 417d) 107
- 105(104). Species occurring along the Atlantic seaboard to Florida and Alabama *paludicola* Schwarz
- Species occurring west of the Mississippi River 106
- 106(105). Lateral margin of elytron with complete vitta (Fig. 407); Arizona ... *filiola* Casey
- Lateral margin of elytron with vitta extending from humeral angle beyond midpoint, apical and discal spots present; Texas, South Dakota *punctata* LeConte
- 107(104). Female pronotum entirely black; basal lobe of male genitalia with lateral projection in basal $\frac{2}{3}$ (Fig. 411a) 108
- Female pronotum with yellow area on lateral margin; basal lobe of male genitalia bisinuate (Fig. 439a), or with broad emargination on sclerotized side (Fig. 425a), or if with lateral projection, then projection near apex (Fig. 453a) 110
- 108(107). Elytron with lateral vitta strongly widened opposite discal spot (Fig. 417d) .. *taeniata* LeConte
- Elytron with lateral spots or vitta, if vitta present, then emarginate opposite discal spot (Fig. 411d) 109
- 109(108). Basal lobe of male genitalia with lateral projection in apical ' (Fig. 411a) *bensonica* Casey
- Basal lobe of male genitalia with lateral projection in basal ' (Fig. 415a) *disrupta* Dobzhansky
- 110(107). Surface of pronotum dull, with strong alutaceous sculpture 111
- Surface of pronotum shiny, polished, usually with alutaceous sculpture absent or visible only under high magnification 112
- 111(110). Lateral yellow area on pronotum as wide or nearly as wide as humeral spot on elytron (Fig. 439d); punctures on elytron much larger than pronotal punctures *undulata* (Say)
- Lateral yellow area on pronotum narrower than humeral spot on elytron, often only ' as wide (Fig. 440d); punctures on elytron slightly larger than on pronotum *octavia* Casey
- 112(110). Species known only from Texas *imitator*, n. sp.
- Species occurring from Arizona and Montana to the Pacific coast 113
- 113(112). Elytron with discal spot wedge-shaped, narrow lateral vitta present from humeral angle onto apical $\frac{1}{3}$ (Fig. 425e); Idaho, Montana, Utah, Washington .. *simulatrix* Dobzhansky
- Elytron usually with discal spot round or elongate, rarely wedge-shaped, rarely with lateral vitta, pattern extremely variable (Fig. 426d-f); California, Nevada *quadrioculata* (Motschulsky)

Section I

The definition of this Section is mainly based on the 11-segmented antennae, but there are some other criteria that apply to nearly all species in the Section as follows: body shape usually rounded, convex; epipleuron of elytron broad, usually with median groove, excavations for femoral apices very deep; base of abdominal sternum within the postcoxal arc usually strongly depressed with transverse fold or suture evident. There are 4 species in the *bigeminata* group in which the first abdominal sternum is similar to that described for Section II; *H. osculans*, *H. revocans*, *H. esclavium*, and *H. triangulum*. These species also have the elytral epipleurae narrower and less deeply excavated than the other species in Section I. I include 3 species with 10-segmented antennae in Section I, *H. rotunda*, *H. connectens*, and *H. dobzhanskyi*, n. sp. These species have the male genitalia characteristic of members of the *bigeminata* group and fit the criteria for Section I as outlined above. I consider the 10-segmented antennae of these 3 species to be an independent reduction without phyletic significance.

proba group

Body very convex, round; female pronotum with large yellow area laterally; male genitalia with paramere broad at base, tapered to slender, rounded process in apical $\frac{1}{3}$, apex with tuft of short setae (Fig. 334a); female spermathecal capsule with appendix nearly as long as basal portion, or longer (Fig. 334d).

Hyperaspis proba (Say)

Fig. 334a-e; Map, Fig. 336

Coccinella proba Say, 1826, p. 303.

Hyperaspis proba: Mulsant, 1850, p. 674.—Crotch, 1873, p. 380.—Crotch, 1874b, p. 235.—LeConte, 1880, p. 188.—Wickham, 1894, p. 304.—Casey 1899, p. 123.—Blatchley, 1910, p. 523.—Leng. 1920, p. 211.—Korschefsky, 1931, p. 194.—Wingo, 1952, p. 25.

Hyperaspis proba proba: Dobzhansky, 1941, p. 22.

Hyperaspis proba var. *trinifer* Casey, 1899, p. 123.—Dobzhansky, 1941, p. 23.

Hyperaspis proba ab. *trinifer*: Korschefsky, 1931, p. 194.

Diagnosis. Length 2.0 to 3.0 mm; width 1.60 to 2.50 mm. Form rounded, convex. Pronotum of male with anterior margin and broad lateral area yellow; pronotum of female with anterior margin black and lateral yellow area smaller than in male. Elytron with 3 yellow or red spots (Fig. 334e). Postcoxal line evenly curved, not quite reaching posterior margin of first abdominal sternum, area within line smooth, nearly impunctate. Male genitalia as in Figure 334a-c. Female genitalia as in Figure 334d.

Discussion. The elytral color pattern of *H. proba* is very distinctive and apparently not variable, making this species one that is easily recognized. The type of *trinifer* Casey is a unique female (holotype).

Type locality. Of *proba*, not stated; of *trinifer*, Las Vegas, New Mexico.

Type depository. Of *proba*, type lost; of *trinifer*, USNM (35163).

Distribution. Figure 336. Maine to South Carolina, west to South Dakota and west Texas.

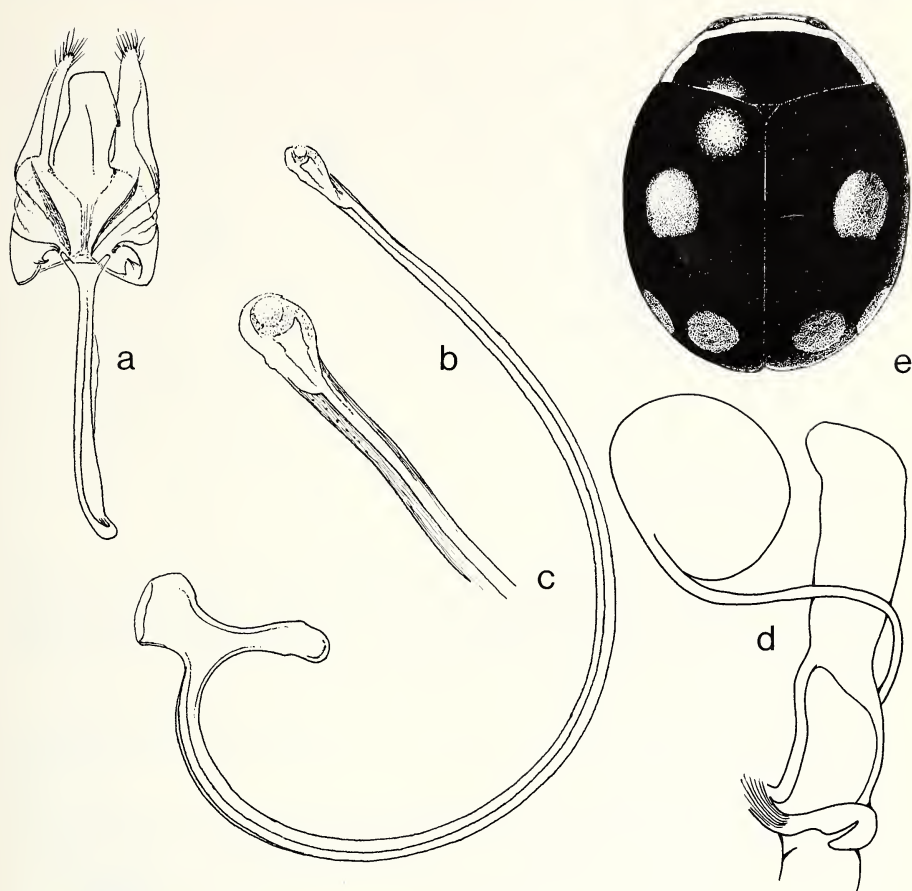


Fig. 334. *Hyperaspis proba*.

Hyperaspis weisei Schaeffer

Fig. 335a, b; Map, Fig. 336

Hyperaspis weisei Schaeffer, 1908, p. 126.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 199.

Hyperaspis proba weisei: Dobzhansky, 1941, p. 23.

Hyperaspis kunzii Schaeffer, 1905, p. 145 (not *kunzii* Mulsant, 1850).—Schaeffer, 1908, p. 127.

Diagnosis. Length 2.25 mm, width 1.85 mm. Form rounded, convex. Description as for *proba* except elytron with marginal spot behind humeral callus, spot extending forward toward anterolateral angle (Fig. 335a). Female genitalia as in Figure 335b.

Discussion. Dobzhansky placed this species as a subspecies of *H. proba* with some reservations. I have examined the female genitalia and find that both the spermathecal capsule and appendix differ considerably from those of *H. proba*. Therefore I am

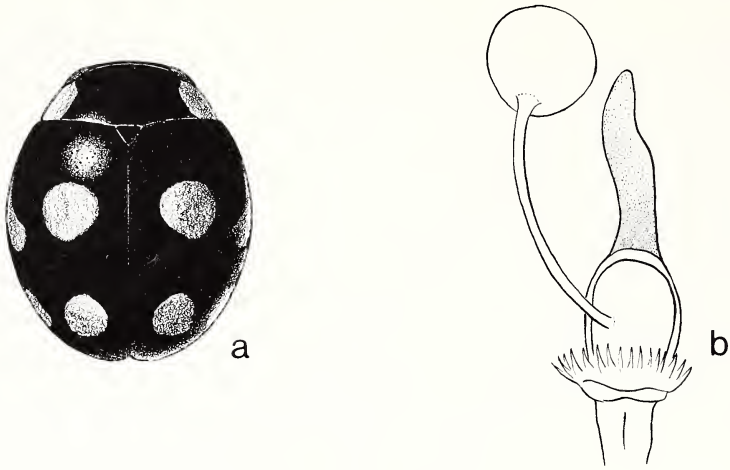


Fig. 335. *Hyperaspis weisei*.

confident that *H. weisei* is a valid species, but is almost certainly a member of the *proba* group. Schaeffer had 2 type specimens of this species, both females, one of which I here designate and label as the lectotype. No other specimens have been examined.

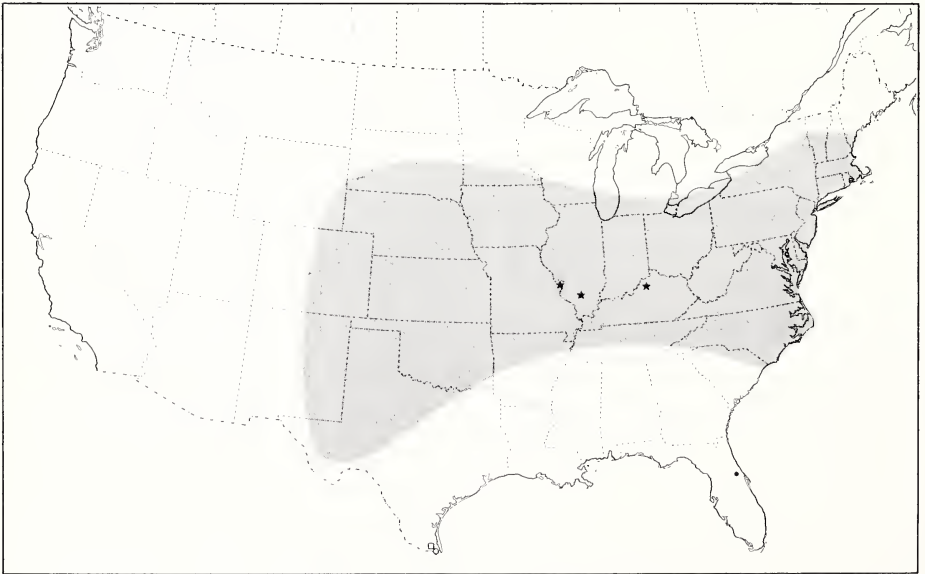


Fig. 336. Distribution. *Hyperaspis proba* (shaded, disjunct locality dotted); *H. weisei* (open circle); *H. rivularis* (star).

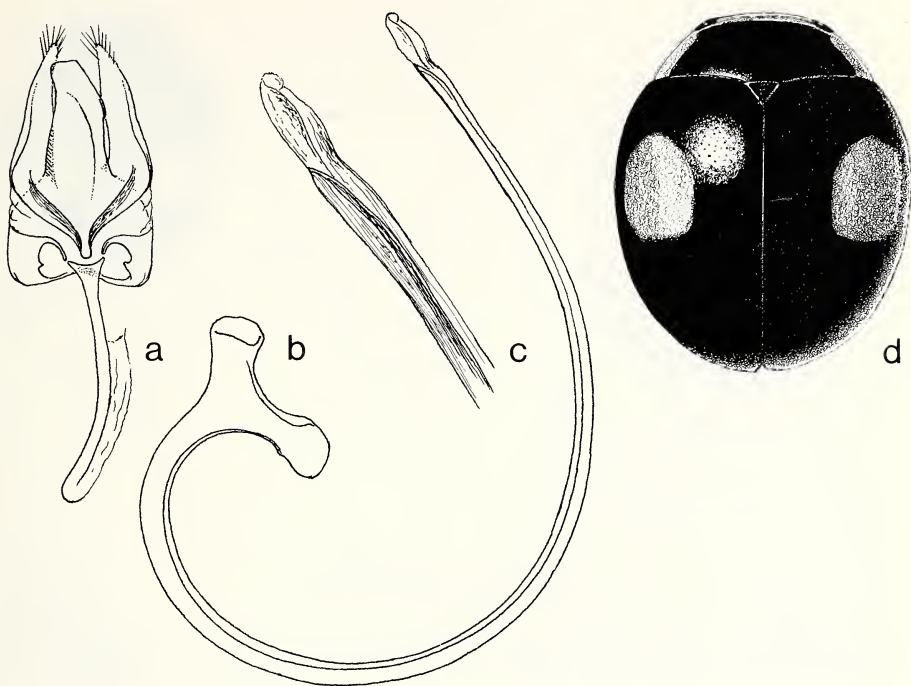


Fig. 337. *Hyperaspis rivularis*.

Type locality. Brownsville, Texas (lectotype here designated).

Type depository. USNM.

Distribution. Figure 336. TEXAS: Brownsville.

Hyperaspis rivularis Dobzhansky

Fig. 337a–d; Map, Fig. 336

Hyperaspis rivularis Dobzhansky, 1941, p. 35.—Wingo, 1952, p. 26.

Diagnosis. Length 2.40 to 3.0 mm, width 1.90 to 2.50 mm. Form rounded, convex. Color pattern as described for *H. proba* except elytron with single yellow or orange discal spot either round or elongate, often very large (Fig. 337d). Postcoxal line on first abdominal sternum and female genitalia as described for *H. proba*. Male genitalia as in Figure 337a–c.

Discussion. Dobzhansky (1941) did not examine the male genitalia of this species and therefore placed it near *H. bigeminata*. The male genitalia are of the *proba* type, but the female pronotal pattern is like that of many species in the *bigeminata* group.

Type locality. Frankfort, Kentucky.

Type depository. USNM (54205).

Distribution. Figure 336. ILLINOIS: "southern." KENTUCKY: type locality. MISSOURI: Cliffcave; St. Louis.

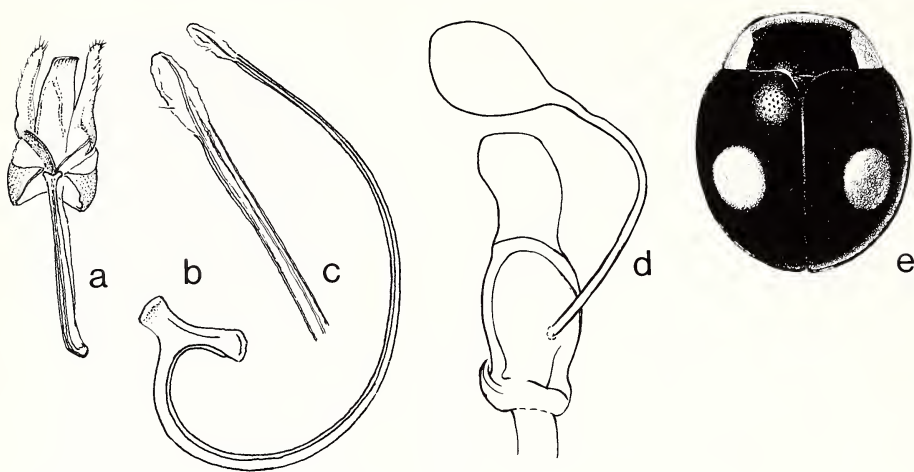


Fig. 338. *Hyperaspis globula*.

Hyperaspis globula Casey
Fig. 338a-e; Map, Fig. 336

Hyperaspis globula Casey, 1899, p. 124.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 189.—Dobzhansky, 1941, p. 24.

Diagnosis. Length 1.80 to 2.0 mm, width 1.40 to 1.60 mm. Form rounded, convex. Pronotum with large yellow area laterally, in male anterior border narrowly yellow, black in female. Elytron with single yellow discal spot (Fig. 338e). Postcoxal line similar to that of *H. proba*, area within line polished, finely punctate. Male genitalia as in Figure 338a-c. Female genitalia as in Figure 338d.

Discussion. The paramere of the male genitalia is not as strongly modified in *H. globula* as it is in *H. proba* and *H. rivularis*, but they are similar enough to indicate a common origin. The female spermathecal capsule does not have the appendix longer than the capsule proper, but it is nearly as long as the capsule and very robust; both the capsule and appendix are definitely of the *proba* type. *Hyperaspis globula* and *H. oculifera* resemble each other externally, but the elytral spots are located more posteriorly and the length is greater in *H. oculifera*. There are 2 type specimens in the Casey collection, the first of these (female) is here designated and labeled as the lectotype, and the other (male) as a paralectotype.

Type locality. Brownsville, Texas (lectotype here designated).

Type depository. USNM (35172).

Distribution. Figure 336. TEXAS: Brownsville.

tuckeri group

Body robust, broad, slightly flattened dorsoventrally; male genitalia similar to *proba* group but with inner membrane of phallobase extending well out of phallobase (Fig. 339a); female spermathecal capsule with appendix much longer than basal portion.

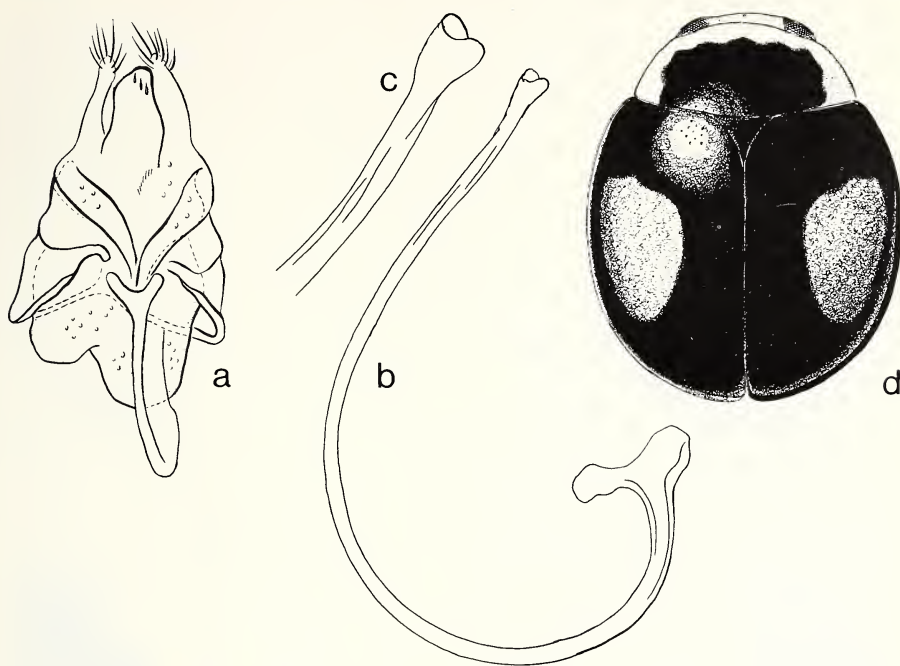


Fig. 339. *Hyperaspis tuckeri*.

This is a compact group of 3 species which are closely related to species of the *proba* group. Examples of these species are extremely rare in collections, their habits apparently are such that they are not taken by the usual collecting methods.

Hyperaspis tuckeri Casey
Fig. 339a-d; Map, Fig. 340

Hyperaspis tuckeri Casey, 1924, p. 162. — Korschefsky, 1931, p. 198. — Dobzhansky, 1941, p. 36.

Diagnosis. Length 3.0 mm, width 2.45 mm. Form robust, elongate, broad. Pronotum of male with lateral $\frac{1}{4}$ yellow and apical margin broadly yellow. Elytron with wide, elongate, red spot (Fig. 339d). Postcoxal line on first abdominal sternum as in *H. proba* except with some fine punctures. Male genitalia as in Figs 339a-c.

Discussion. The unique male type and one other specimen are all I have seen. This is a striking species because of the large, red elytral spots and broadly yellow pronotal margins, and does not closely resemble any other Arizona species (see remarks under *H. jovialis*).

Type locality. Tucson, Arizona.

Type depository. USNM (35164).

Distribution. Figure 340. ARIZONA: type locality; Globe.

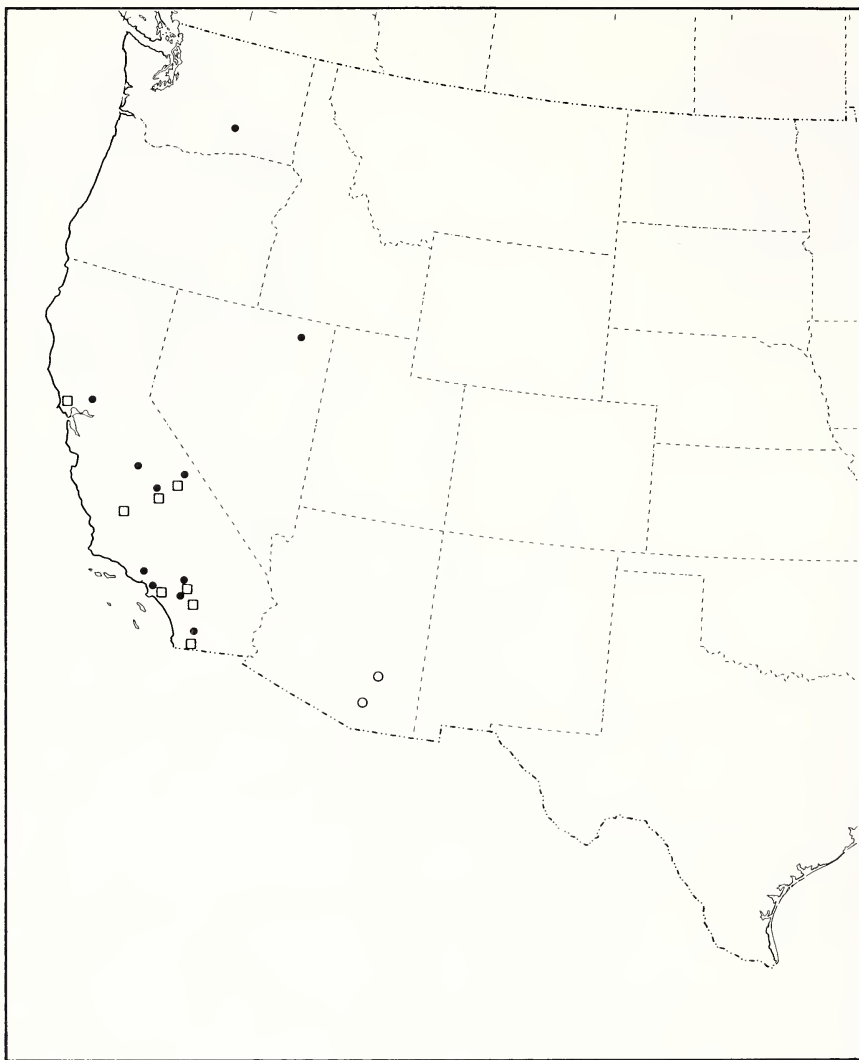


Fig. 340. Distribution. *Hyperaspis tuckeri* (open circle); *H. jovialis* (dot); *H. leachi* (square).

Hyperaspis jovialis Fall
Fig. 341a-f; Map, Fig. 340

Hyperaspis jovialis Fall, 1925, p. 311.—Korschefsky, 1931, p. 190.—Dobzhansky, 1941, p. 80.

Hyperaspis californica Dobzhansky, 1941, p. 81. **New Synonymy.**

Hyperaspis taeniata perpallida Dobzhansky, 1941, p. 44. **New Synonymy.**

Diagnosis. Length 2.40 to 2.80 mm, width 1.70 to 2.0 mm. Form robust, elongate,

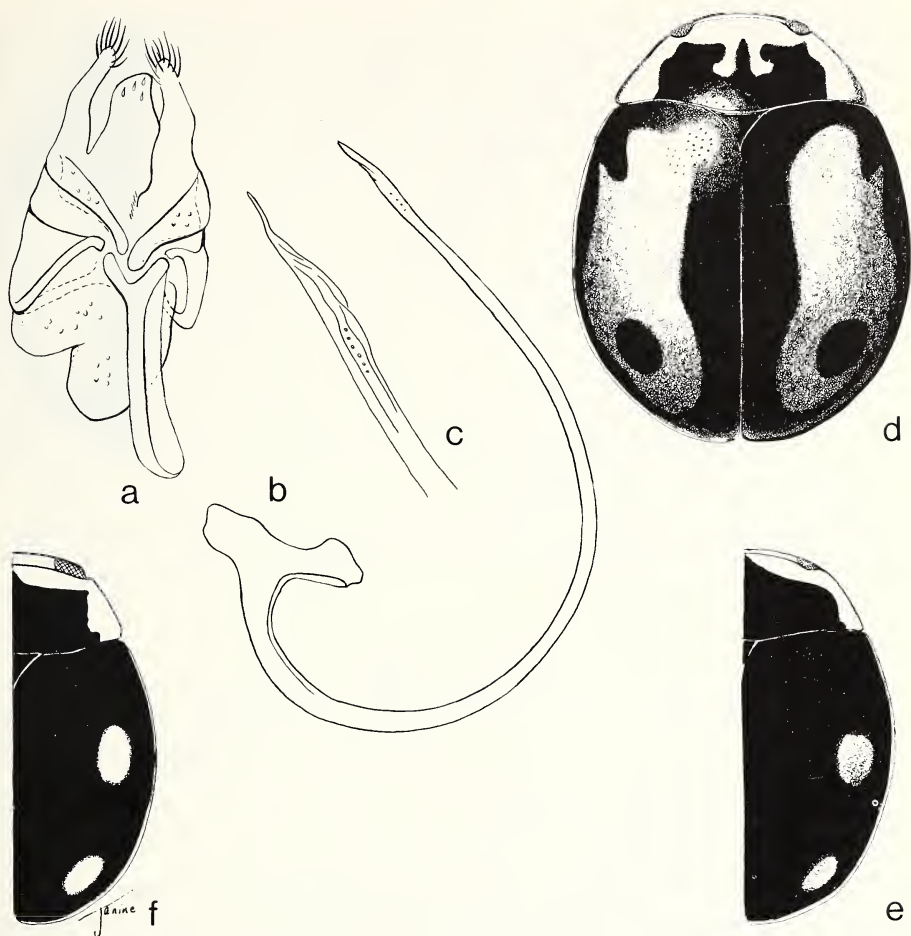


Fig. 341. *Hyperaspis jovialis*.

broad. Pronotum of male with lateral $\frac{1}{4}$ yellow and apical margin either broadly yellow or with yellow median area (Fig. 341d-f); pronotum of female entirely black except lateral margin narrowly yellow. Color pattern on elytron variable from black with 2 orange spots (Fig. 341e) to mostly orange with black border and enclosed black spot (Fig. 341d). Postcoxal line not reaching hind margin of first abdominal sternum, flattened along hind margin, outer $\frac{1}{3}$ straight, area within line smooth, with some vague punctures. Male genitalia as in Figure 341a-c. Female genitalia as figured for *H. leachi*.

Discussion. This species, *H. leachi*, and *H. tuckeri*, are very similar in both external and internal characteristics. On the basis of specimens examined, I presently regard them all as valid species, but very few specimens exist in collections, and it is possible that all of these names are synonyms. However, the extent of character variation

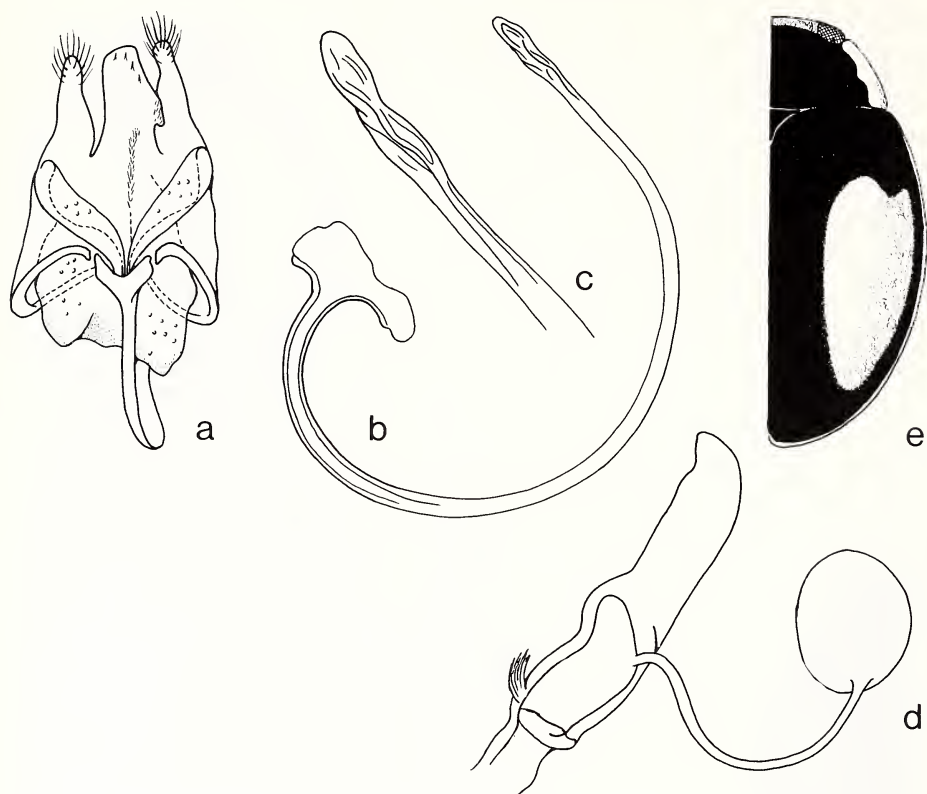


Fig. 342. *Hyperaspis leachi*.

cannot be determined at present. El-Ali (unpubl. dissertation) considered *H. californica* Dobzhansky a junior synonym of *H. jovialis*, an opinion with which I agree. *Hyperaspis taeniata perpallida* Dobzhansky is a pale variant and junior synonym of *H. jovialis*. The unique type (holotype) of *jovialis* is a female labeled "Kern Co. Cal./Havilah VI-5-13/*jovialis* Type/M.C.Z. Type 24542/Fall collection."

Type locality. Of *jovialis*, Havilah, Kern Co., California; of *californica*, Mount San Jacinto, California; of *perpallida*, Sacramento, Co., Grand Island, California.

Type depository. Of *jovialis*, MCZ; of *californica* (54220) and *perpallida* (54206), USNM.

Distribution. Figure 340. CALIFORNIA: Bishop; Claremont; Fresno Co; L. Arrowhead; San Bernardino Co., Forest Home; S. Jacinto Mts.; Tulare Co.; Ventura Co., Lockwood Valley; Yolo Co., Davis. NEVADA: Carlin. WASHINGTON: Soap Lake.

Hyperaspis leachi Nunenmacher

Fig. 342a-e; Map, Fig. 340

Hyperaspis leachi Nunenmacher, 1934, p. 19.—Dobzhansky, 1941, p. 31.

Diagnosis. Length 2.40 to 3.10 mm, width 1.80 to 2.60 mm. Description as for *H. jovialis* except pronotum of male mostly black, lateral $\frac{1}{2}$ and narrow apical margin yellow; female pronotum black except lateral margin narrowly yellow; elytron with large, discrete orange spot nearly reaching lateral margin (Fig. 342e). Male genitalia as in Figure 342a–c. Female genitalia as in Figure 342d.

Discussion. *Hyperaspis leachi* is very similar to *H. tuckeri* and *H. jovialis* (see remarks under *H. jovialis*), but can be separated from either of those species by the pronotal and elytral color pattern. Males of both *H. jovialis* and *H. tuckeri* have the apical margin of the pronotum broadly yellow and the lateral $\frac{1}{4}$ yellow. Males of *H. leachi* have the apical margin narrowly yellow and the lateral $\frac{1}{2}$ or less yellow. The orange spot on the elytron nearly reaches the lateral margin in *H. leachi*, but is clearly separate from the margin in both *H. jovialis* and *H. tuckeri*. Nunenmacher (1925) designated 2 primary types (male and female). I here designated and label the male labeled "Riverside Co. Cal. III-25-18 E. R. Leach Coll./male sign/ *Hyperaspis leachi* Nun." as the lectotype. The female is designated as a paralectotype.

Type locality. Riverside Co., California (lectotype here designated).

Type depository. CAS.

Distribution. Figure 340. CALIFORNIA: Inyo Co., Independence; Kern Co.; San Bernardino Co., Hesperia; Jacumba; San Diego; Los Angeles Co.; Sonoma Co.; Tulare Co., Isabella.

binotata group

Male genitalia with paramere slender, slightly narrowed toward apex, basal lobe slender, nearly parallel-sided, apex obliquely truncate (Fig. 343a); female spermathecal capsule rounded, appendix very small.

Hyperaspis inedita has the *bigeminata* pronotal color pattern in the female, but the male genitalia are of the *binotata* type. All members of this group have the elytron black with one or two red or yellow spots except *H. octonotata* which has 4 yellow spots on each elytron but possesses the *binotata* type of genitalia.

Hyperaspis binotata (Say)

Fig. 343a–d; Map, Fig. 344

Coccinella binotata Say, 1826, p. 302.

Hyperaspis binotata: Crotch, 1873, p. 380.—Casey, 1899, p. 124.—Blatchley, 1910, p. 523.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 196.—Dobzhansky, 1941, p. 27.—Wingo, 1952, p. 25.—Watson, 1960, p. 232.—Watson, 1969, p. 370.—J. Chapin, 1974, p. 41.

Coccinella normata Say, 1826, p. 302.

Hyperaspis normata Crotch, 1873, p. 380.

Coccinella affinis Randall, 1838b, p. 50.—Mulsant, 1850, p. 1051.

Hyperaspis leucopsis Melsheimer, 1847, p. 179.—Crotch, 1873, p. 380.

Hyperaspis paspalis Watson, 1960, p. 233.—Watson, 1969, p. 370. **New Synonymy.**

Diagnosis. Length 2.40 to 4.50 mm, width 1.90 to 3.70 mm. Form rounded, convex. Pronotum of male narrowly yellow on lateral margin, often narrowly yellow on anterior margin; pronotum of female black. Elytron black with single red spot (Fig.

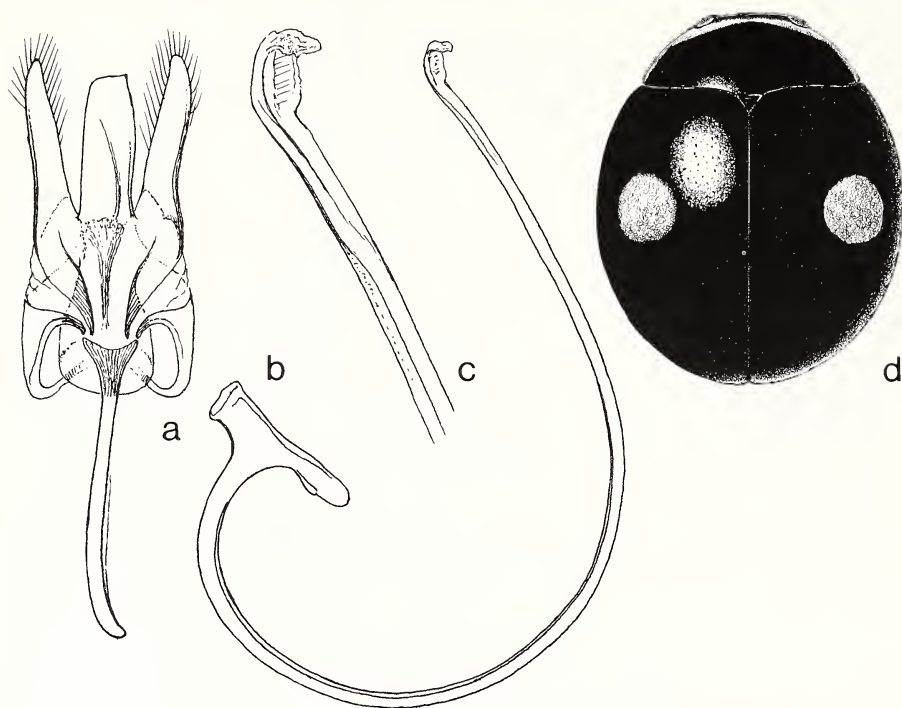


Fig. 343. *Hyperaspis binotata*.

343d), rarely with apical spot (see remarks under *H. signata*). Postcoxal line not reaching hind margin of first abdominal sternum, briefly flattened along hind margin, area within line distinctly punctate. Male genitalia as in Figure 343a-c.

Discussion. *Hyperaspis binotata* is a common, widespread species recognized with certainty only if the male genitalia are examined. I have examined the holotype and several paratypes of *H. paspalis* Watson, and am unable to separate *H. paspalis* from *H. binotata*. The key character used by Watson to distinguish *H. paspalis* concerns the prosternal carinae which are supposed to be parallel, not joining anteriorly in *H. paspalis*, convergent and joined anteriorly in *H. binotata*. This character is variable in any long series of *H. binotata*, and even some of the paratypes of *H. paspalis* have convergent carinae. The male genitalia are also somewhat variable and those of *H. paspalis* vary within the range exhibited by *H. binotata*. Watson (1960) illustrated the male genitalia of *H. paspalis* in ventral view and those of *H. binotata* in dorsal view which, because of the asymmetrical basal lobe, presents a somewhat confusing picture.

Type locality. Of *binotata* and *normata*, not stated; of *affinis*, "vicinity of Boston"; of *leucopsis*, Pennsylvania; of *paspalis*, Iron Bridge, Ontario.

Type depository. Of *binotata* and *normata*, types lost; of *affinis*, not located; of *leucopsis*, not located; of *paspalis*, CNC.

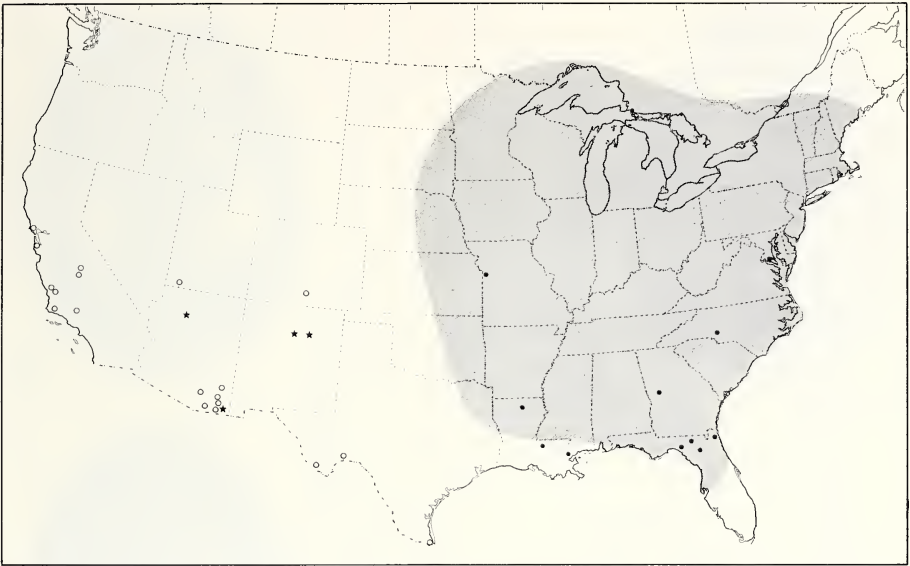


Fig. 344. Distribution. *Hyperaspis binotata* (shaded); *H. haematosticta* (star); *H. inedita* (dot); *H. octonotata* (open circle).

Distribution. Figure 344. Maine and Quebec to North Carolina, west to North Dakota and Louisiana. Peripheral locality; DeFuniak Spring, Florida.

Hyperaspis haematosticta Fall

Fig. 345a-c; Map, Fig. 344

Hyperaspis haematosticta Fall, 1907, p. 222.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 190.—Dobzhansky, 1941, p. 29.

Diagnosis. Length 2.70 to 3.80 mm, width 1.90 to 2.70 mm. Form elongate, convex. Pronotal color pattern as in *H. binotata*. Elytron with single red discal spot or with discal spot plus apical spot (Fig. 345d, e). Postcoxal line reaching hind margin of first abdominal sternum, flattened along margin, outer $\frac{1}{3}$ abruptly angled forward, area within line smooth with scattered coarse punctures. Male genitalia as in Figure 345a-c.

Discussion. The combination of elongate body and elytral color pattern makes *H. haematosticta* a reasonably distinctive species in the geographic region in which it occurs. Fall had 3 types of this species but I have seen only a single female type labeled "Santa Fe N.M. 8.97/haematosticta TYPE/head, front and sides of tho. pale/M.C.Z. Type 24541(red paper)/H.C. Fall Collection/*Hyperaspis haematosticta* Fall" which I designate and label the lectotype.

Type locality. Santa Fe, New Mexico (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 344. ARIZONA: Chiricahua Mts.; Williams. NEW MEXICO: Las Vegas.

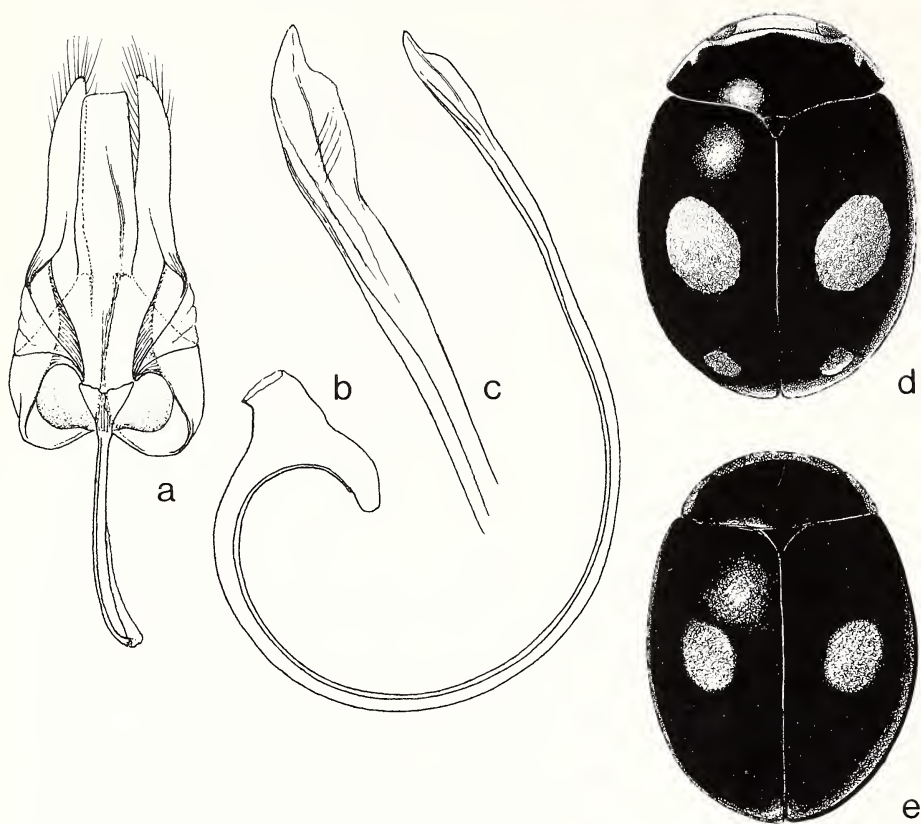


Fig. 345. *Hyperaspis haematosticta*.

Hyperaspis inedita Mulsant

Fig. 346a-d; Map, Fig. 344

Hyperaspis inedita Mulsant, 1850, p. 684.—Crotch, 1873, p. 380.—Crotch, 1874b, p. 238.—Casey, 1899, p. 124.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 190.—Dobzhansky, 1941, p. 28.

Hyperaspis regalis Casey, 1899, p. 123.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 195.—Dobzhansky, 1941, p. 31. **New Synonymy.**

Hyperaspis nigropennis Blatchley, 1924, p. 167.—Korschefsky, 1931, p. 192.—Dobzhansky, 1941, p. 84. **New Synonymy.**

Hyperaspis pinorum Casey, 1924, p. 162.—Korschefsky, 1931, p. 194.—Dobzhansky, 1941, p. 28.—J. Chapin, 1974, p. 43. **New Synonymy.**

Hyperaspis centralis plagiata Dobzhansky, 1941, p. 34. **New Synonymy.**

Diagnosis. Length 2.65 to 3.0 mm, width 1.90 to 2.30 mm. Form elongate oval, convex. Pronotum of male with anterior margin and broad lateral area yellow; pronotum of female with anterior margin black, broad lateral area yellow. Elytron with

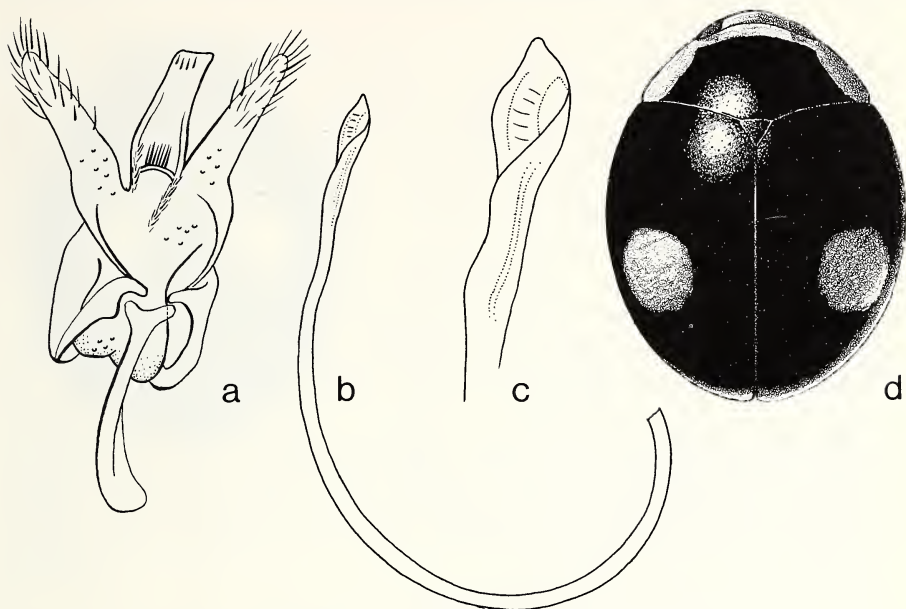


Fig. 346. *Hyperaspis inedita*.

single red spot of variable size, rarely immaculate (Fig. 346d). Postcoxal line reaching hind margin of first abdominal sternum, flattened along margin, then evenly curved forward in outer $\frac{1}{3}$, area within line smooth with scattered, coarse punctures. Male genitalia as in Figure 346a–c.

Discussion. The broadly yellow pronotal margin of the female causes this species to resemble members of the *bigeminata* and *proba* groups. The elongate shape, pronotal color pattern, and geographic distribution will usually allow *H. inedita* to be recognized, but genitalia should be examined when males are available. A single female of *H. inedita* exists in the Dejean collection labeled “Amer. bor. LeConte,” designated a lectotype by Gordon (1974c). *Hyperaspis pinorum* Casey is a junior synonym of *inedita* as suggested by Dobzhansky (1941). There are 4 types of *pinorum* in the Casey collection; and I here designate and label the first of these (male) as the lectotype and the remainder as paralectotypes. The holotype of *H. nigropennis* is a female lacking elytral spots. Rarely does a specimen of *H. inedita* lack these spots, but in all other characteristics *H. nigropennis* and *H. inedita* appear to be conspecific, therefore I consider *H. nigropennis* to be a junior synonym. *Hyperaspis regalis* is an example of *H. inedita* with greatly enlarged elytral spots. The type is a unique female (holotype) in the Casey collection.

Type locality. Of *inedita*, “L’Amerique septentrionale” (lectotype here designated); of *regalis*, Jacksonville, Florida; of *pinorum*, Southern Pines, North Carolina (lectotype here designated); of *nigropennis*, Dunedin, Florida; of *centralis plagiata*, 2.3 miles east of Piney Point, Maryland.

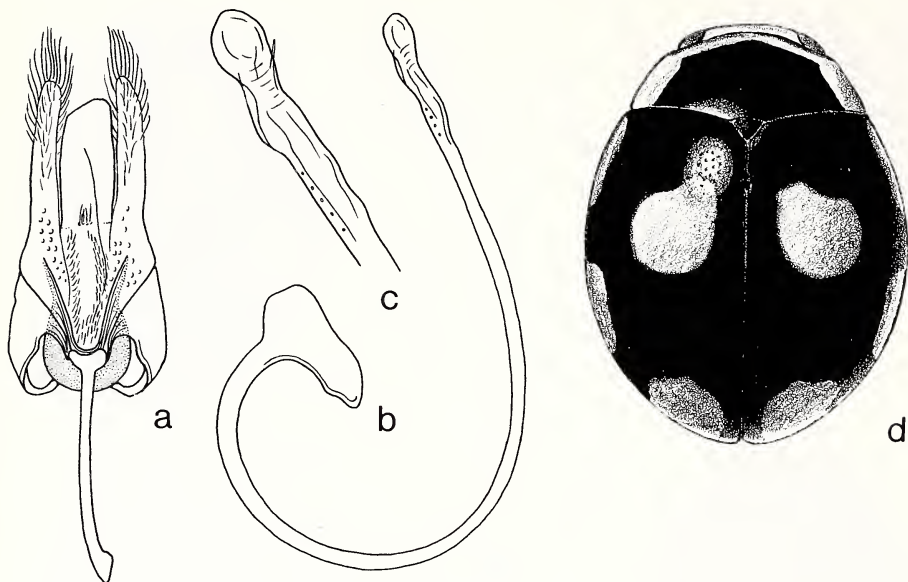


Fig. 347. *Hyperaspis octonotata*.

Type depository. Of *inedita*, DLM; of *regalis* (35165), *pinorum* (35173), and *centralis plagiata* (54204), USNM; of *nigropennis*, PU.

Distribution. Figure 344. FLORIDA: Gainesville; Lake City; Navarre; Perry. GEORGIA: Barnsville; Milner. LOUISIANA: Baton Rouge; Ouachita Parish; St. Tammany Parish. MISSOURI: Jackson Co., Lee Summit. NORTH CAROLINA: Southern Pines.

Hyperaspis octonotata Casey

Fig. 347a–d; Map, Fig. 344

Hyperaspis 8-notata Casey, 1899, p. 121.

Hyperaspis octonotata: Leng, 1920, p. 211.—Korschefsky, 1931, p. 193.—Dobzhansky, 1941, p. 7.

Diagnosis. Length 2.30 to 3.50 mm, width 1.90 to 2.80 mm. Form rounded, convex. Pronotum of male with anterior margin and broad lateral area yellow; pronotum of female with anterior margin black, lateral area broadly yellow. Elytron with 4 yellow or red spots (Fig. 347d), anterior margin of discal spot obliquely truncate or emarginate. Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved throughout. Male genitalia as in Figure 347a–c.

Discussion. The color pattern alone is sufficient for recognition of *H. octonotata*, the arrangement of the elytral spots and the shape of the discal spot are unique in the North American fauna. The type in the Casey collection is a unique female (holotype).

Type locality. Arizona.

Type depository. USNM (35148).

Distribution. Figure 344. ARIZONA: Benson; Cochise Co., Palmerly; Douglas; Graham Co.; Huachuca Mts.; Sta. Catalina Mts.; Tucson; Thatcher; Wilcox. CALIFORNIA: Ft. Tejon; Lebec; Los Gatos; Palo Alto; Redwood City; Santa Barbara; Santa Maria; Sequoia Nat. Pk.; Tulare Co. COLORADO: Canon City. TEXAS: Brownsville; Presidio; Sanderson. UTAH: St. George.

signata group

Female pronotum always entirely black; male genitalia with paramere slender, slightly narrowed toward apex, basal lobe narrow at base, wide at apex, apex truncate or obliquely truncate (Fig. 348a); female spermathecal capsule rounded, appendix very small (Fig. 348d).

This group contains those members of *Hyperaspis* most difficult to separate from each other; in most cases male genitalia must be examined to correctly identify a species. The shape is mostly oval and convex; the dorsal color is black with one or 2 red or yellow spots on each elytron; adequate external structural characters are lacking.

Hyperaspis signata signata (Olivier)

Fig. 348a–f; Map, Fig. 349

Coccinella signata Olivier, 1808, p. 1047.

Hyperaspis signata Mulsant, 1850, p. 683.—Crotch, 1873, p. 380.—Crotch, 1874b, p. 234.—LeConte, 1880, p. 187.—Casey, 1899, p. 122.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 196.—Dobzhansky, 1941, p. 28.—Wingo, 1952, p. 25.—J. Chapin, 1974, p. 41.

Hyperaspis taedata LeConte, 1880, p. 187.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 197.—Dobzhansky, 1941, p. 20. **New Synonymy.**

Diagnosis. Length 2.60 to 4.0 mm, width 1.90 to 3.20 mm. Form oval, convex. Pronotum of male with anterior and lateral margins narrowly yellow. Elytron with one or 2 yellow or red spots (Fig. 348e, f), rarely with discal spot enlarged to humeral angle. Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved except outer $\frac{1}{3}$ straight, area within line polished with scattered, coarse punctures. Male genitalia as in Figure 348a–c. Female genitalia as in Figure 348d.

Discussion. This species is very similar to *H. pistillata* Watson. The male genitalia are quite distinctive for both species, in addition, the distal capsule of the female spermathecae differ where the connecting ducts enter. In *H. signata* the connecting duct and process of the capsule merge smoothly while in *H. pistillata* the duct is noticeably more slender than the process of the capsule. *Hyperaspis signata* is a common eastern species which has undoubtedly been mixed with several other species in collections of any size for the past 100 years. I have not seen the Olivier type material and therefore am not certain of the exact identity of *H. signata*. However, I am arbitrarily assigning the name *H. signata* to the species described here as did Dobzhansky (1941). The type series of *H. taedata* consists of 2 specimens, a female with the typical *signata* color pattern labeled “Baldwin June 1, Fla/963/Type 6711/

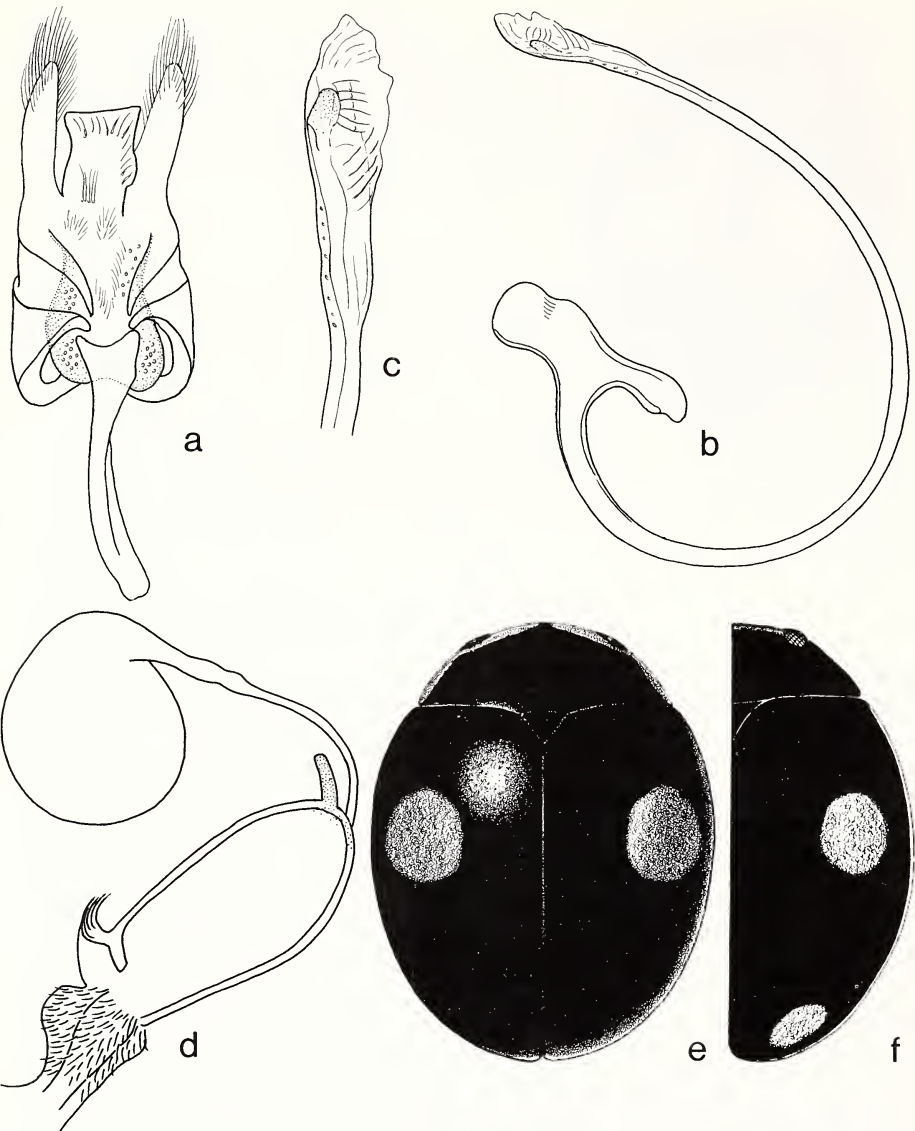


Fig. 348. *Hyperaspis signata signata*.

H. taedata LeC,” and a male with an odd color pattern which I designate the lectotype labeled “/Sand Pt. Fla./18.2/964.” The color pattern of the lectotype is very unusual for this species. A unique male in the USNM collection, also from Florida, has an identical color pattern but is a specimen of *H. binotata*! In both instances the male

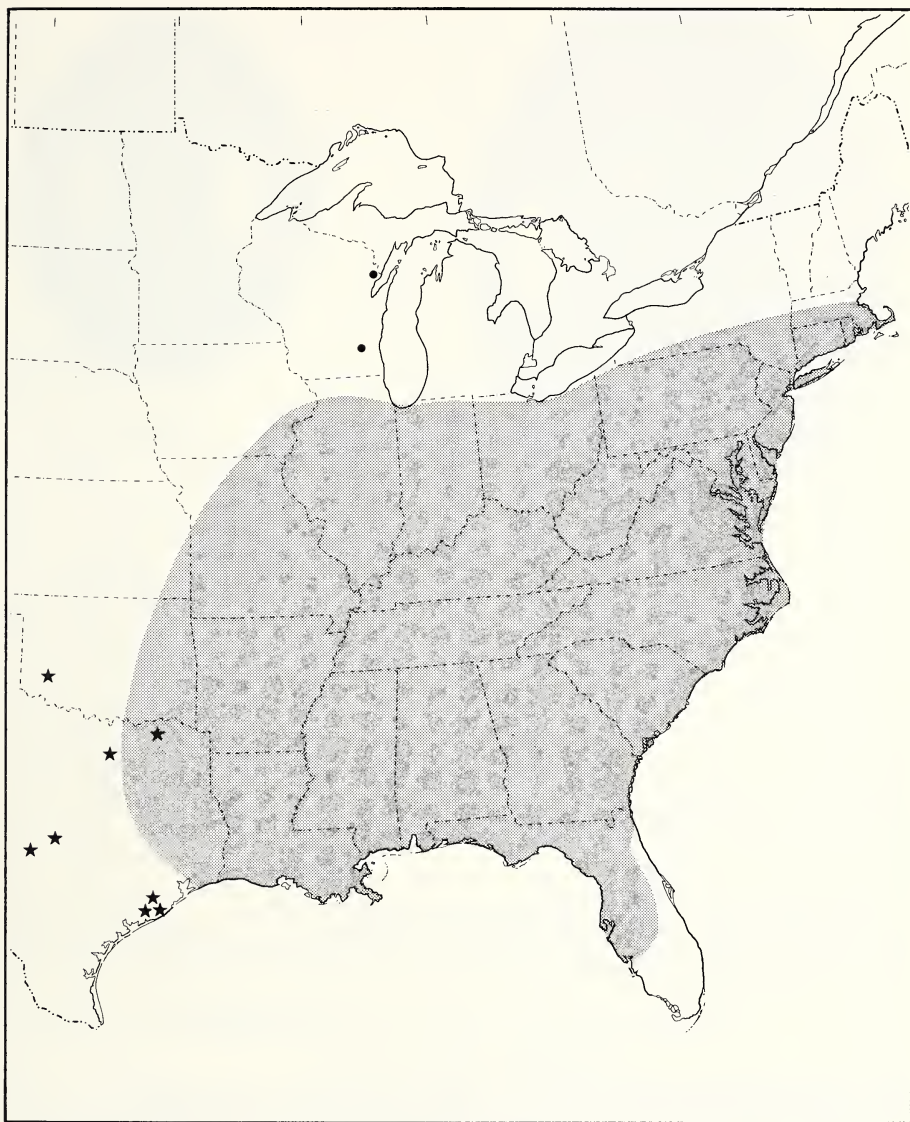


Fig. 349. Distribution. *Hyperaspis signata signata* (shaded, disjunct localities dotted); *H. s. bicentralis*; (star).

genitalia are the criteria for placement, and I consider *H. taedata* a junior synonym of *H. signata*.

Type locality. Of *signata*, "Elle se trouve la Caroline"; of *taedata*, Sand Point, Florida (lectotype here designated).

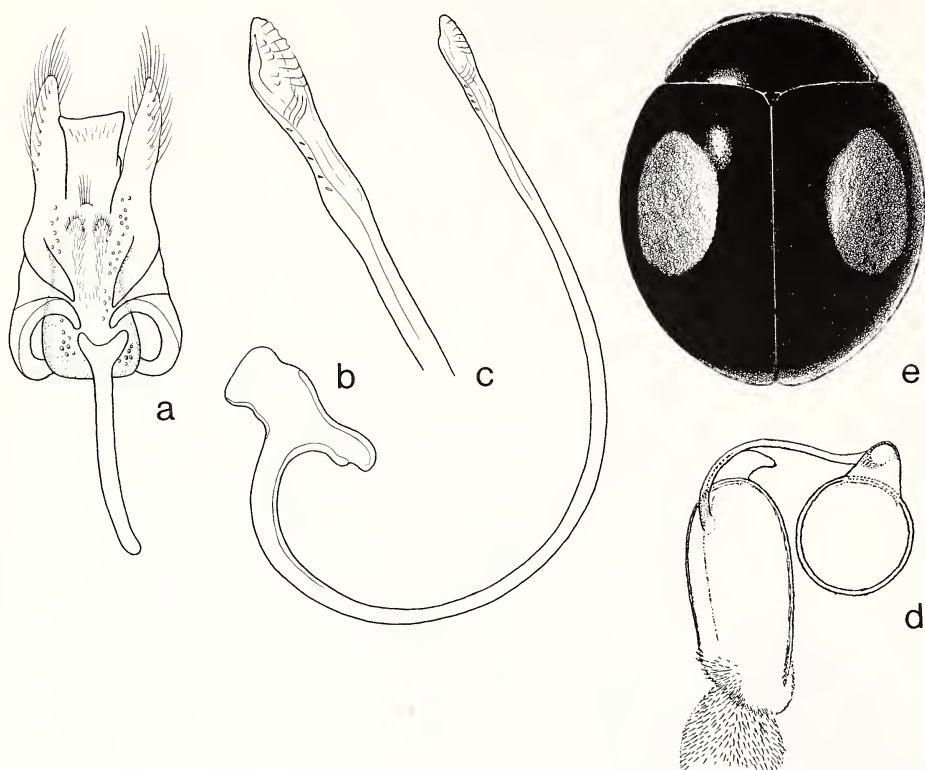


Fig. 350. *Hyperaspis signata bicentralis*.

Type depositary. Of *signata*, type not seen; of *taedata*, MCZ.

Distribution. Figure 349. Massachusetts to Florida, west to Wisconsin and east Texas. Peripheral localities; Beaver Dam and Marinette Co., Wisconsin.

Hyperaspis signata bicentralis Casey, new status

Fig. 350a–e; Map, Fig. 349

Hyperaspis bicentralis Casey, 1899, p. 124.—Korschefsky, 1931, p. 184.

Hyperaspis bicentralis bicentralis: Dobzhansky, 1941, p. 32.

Diagnosis. Length 2.60 to 3.25 mm, width 2.20 to 2.70 mm. Description as for *H. signata* except average size smaller; discal spot on elytron large, apical spot lacking (Fig. 350e); basal lobe of male genitalia longer and narrower (Fig. 350a). Female genitalia as in Figure 350d.

Discussion. In view of the differences between *H. signata* and *H. bicentralis* listed above, I prefer to maintain *H. bicentralis* as a subspecies rather than a synonym of *H. signata*. Two specimens from College Station, Texas, have been examined which are intermediate between *H. signata* and *H. bicentralis*, therefore I regard *H. bicen-*

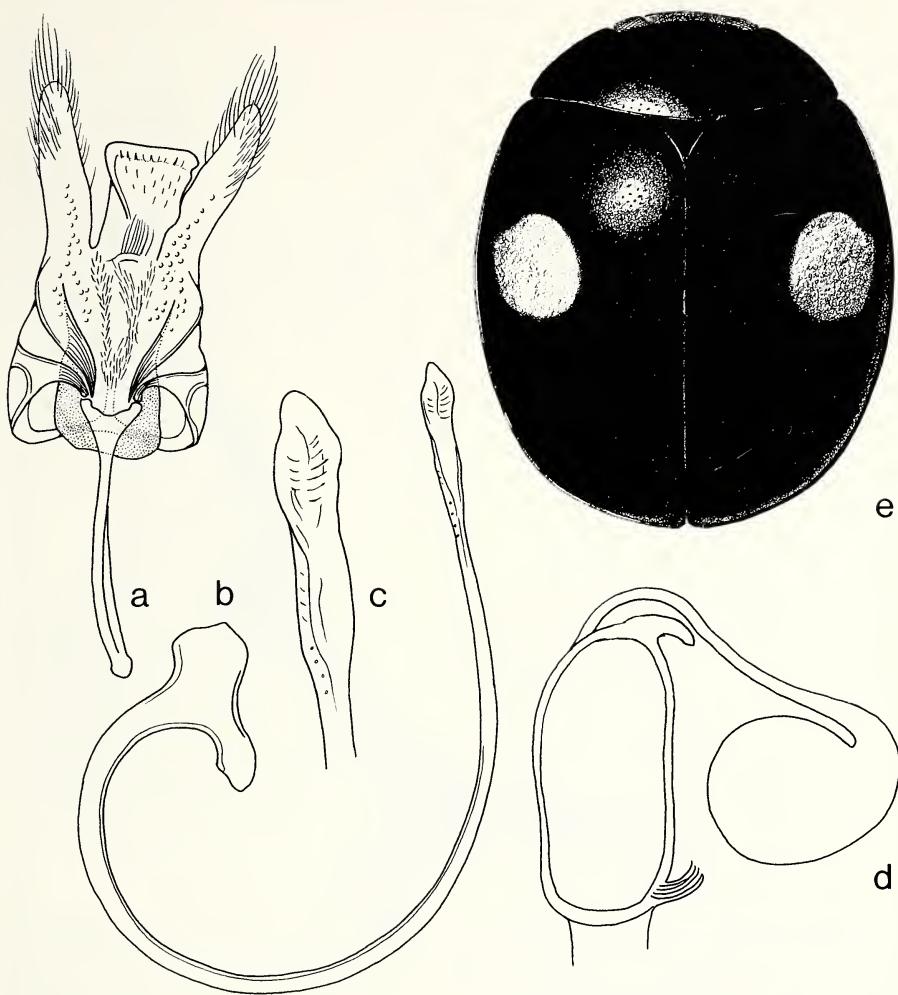


Fig. 351. *Hyperaspis pistillata*.

tralis as a well characterized subspecies of *H. signata*. The type of *H. bicentralis* is a unique female in the Casey collection (holotype).

Type locality. Colorado River above Columbus, Austin, Texas.

Type depository. USNM (35170).

Distribution. Figure 349. OKLAHOMA: Mountain Pk. TEXAS: Austin; Dallas; Kerrville; Lavaca Co.; Otey; Paris; Victoria.

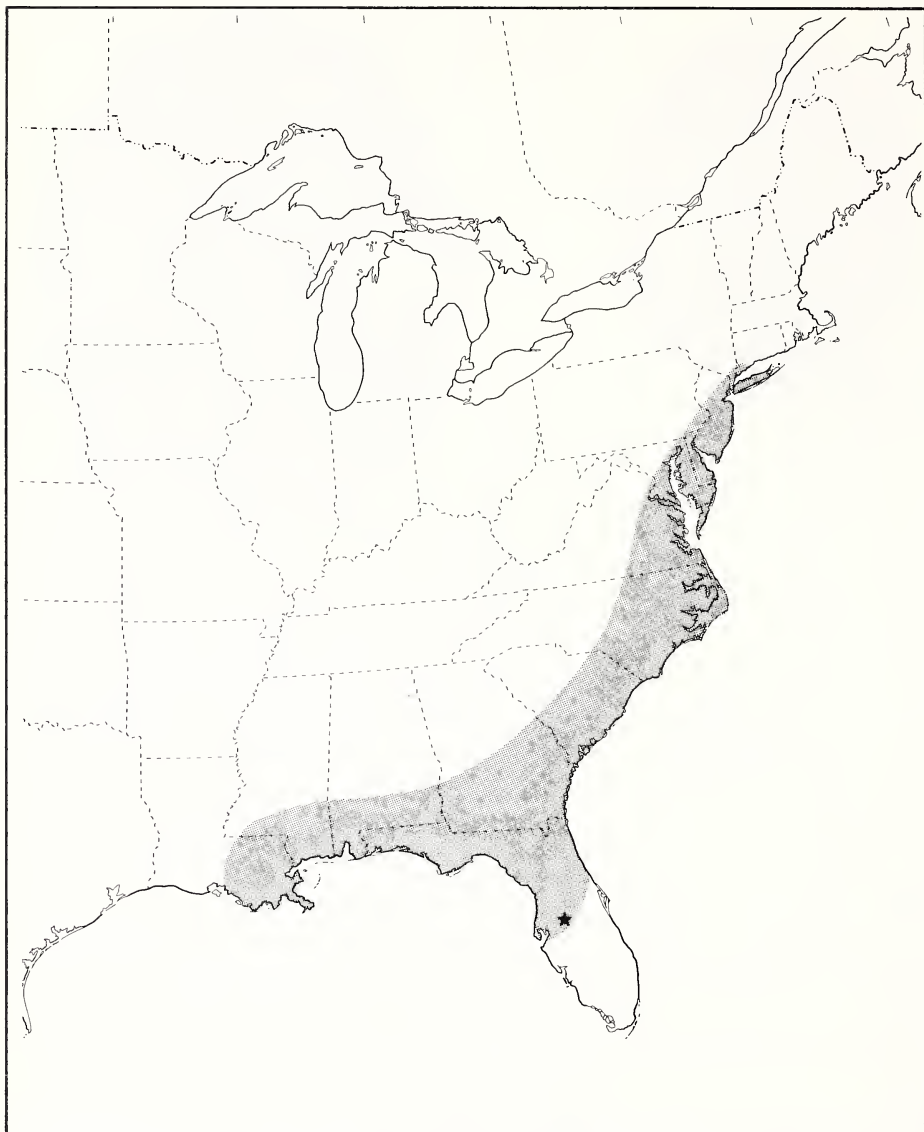


Fig. 352. Distribution. *Hyperaspis pistillata* (shaded); *H. nigrosuturalis* (star).

Hyperaspis pistillata Watson
Fig. 351a-c; Map, Fig. 352

Hyperaspis pistillata Watson, 1969, p. 369.

Diagnosis. Length 2.75 to 4.0 mm, width 2.20 to 3.10 mm. Form oval, convex.

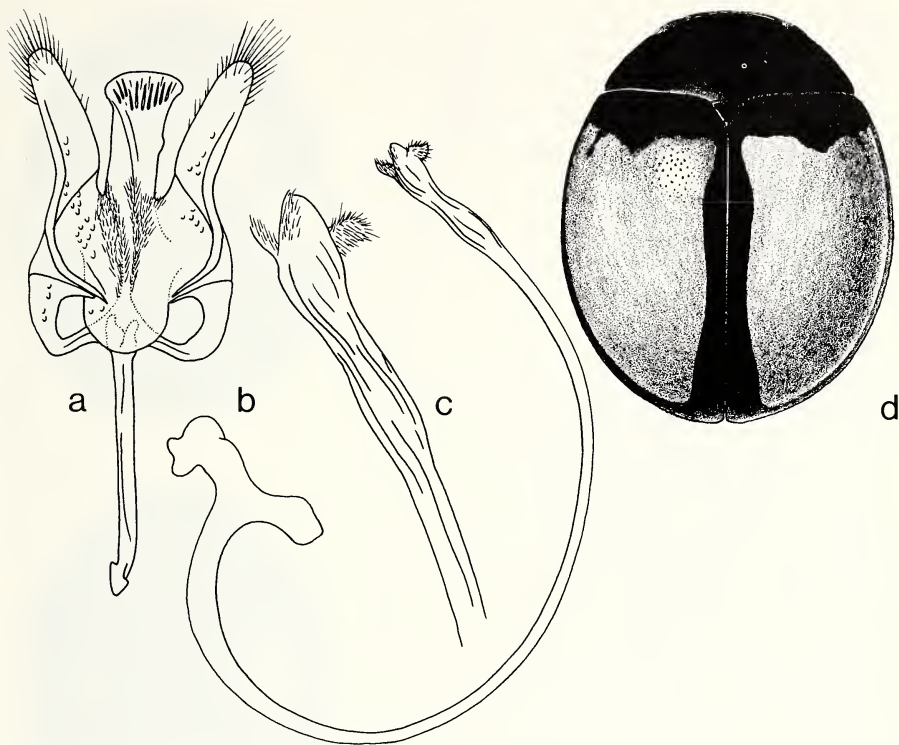


Fig. 353. *Hyperaspis nigrosuturalis*.

Pronotum of male with anterior and lateral margins yellow; pronotum of female entirely black. Elytron with one or 2 yellow or red spots (Fig. 351e), as in *H. signata*. Postcoxal line not reaching hind margin of first abdominal sternum, more or less evenly curved, area within line smooth, coarsely punctured except depressed apical portion strongly alutaceous. Male genitalia as in Figure 351a–c. Female genitalia as in Figure 351d.

Discussion. This species closely resembles *H. signata*; see comparative remarks under *H. signata*.

Type locality. Dunedin, Florida.

Type depository. UMMZ.

Distribution. Figure 352. Massachusetts to Florida and Louisiana.

Hyperaspis nigrosuturalis Blatchley

Fig. 353a–d; Map, Fig. 352

Hyperaspis nigrosuturalis Blatchley, 1918, p. 420.—Leng, 1920, p. 212.—Blatchley, 1930, p. 43.—Korschefsky, 1931, p. 192.—Dobzhansky, 1941, p. 32.

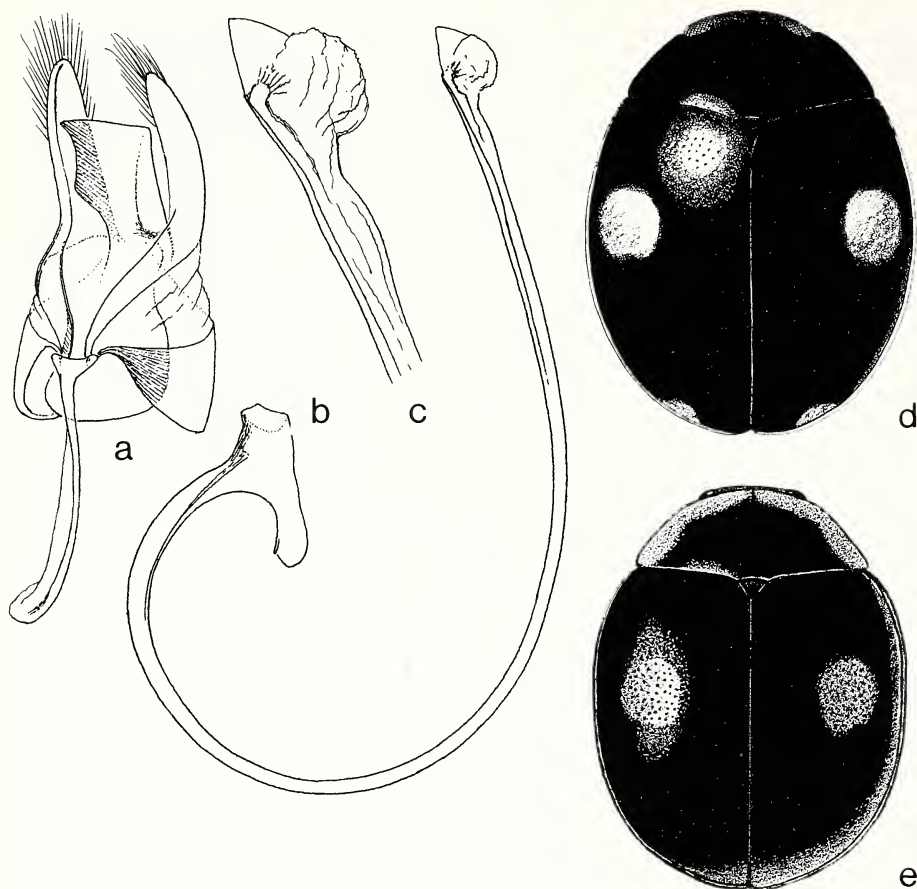


Fig. 354. *Hyperaspis conviva*.

Diagnosis. Length 3.40 mm, width 2.70 mm. Form oval, convex. Head of male yellow except vertex black, entirely black in female. Pronotum of male with lateral margin narrowly yellow; pronotum of female entirely black. Elytron red except margins narrowly black (Fig. 353d). Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved except outer $\frac{1}{3}$ slightly angulate, area within line rough, coarsely, densely punctured. Male genitalia as in Figure 353a-c. Female genitalia as figured for *H. pistillata*.

Discussion. I have seen only the holotype and one other specimen of this distinctive species. The male genitalia are very similar to those of *H. pistillata*, but *H. nigrosuturalis* would not normally be associated with *H. pistillata* because the dorsal color patterns are so different.

Type locality. Lakeland, Florida.

Type depository. PU.

Distribution. Figure 352. FLORIDA: Lake Alfred.

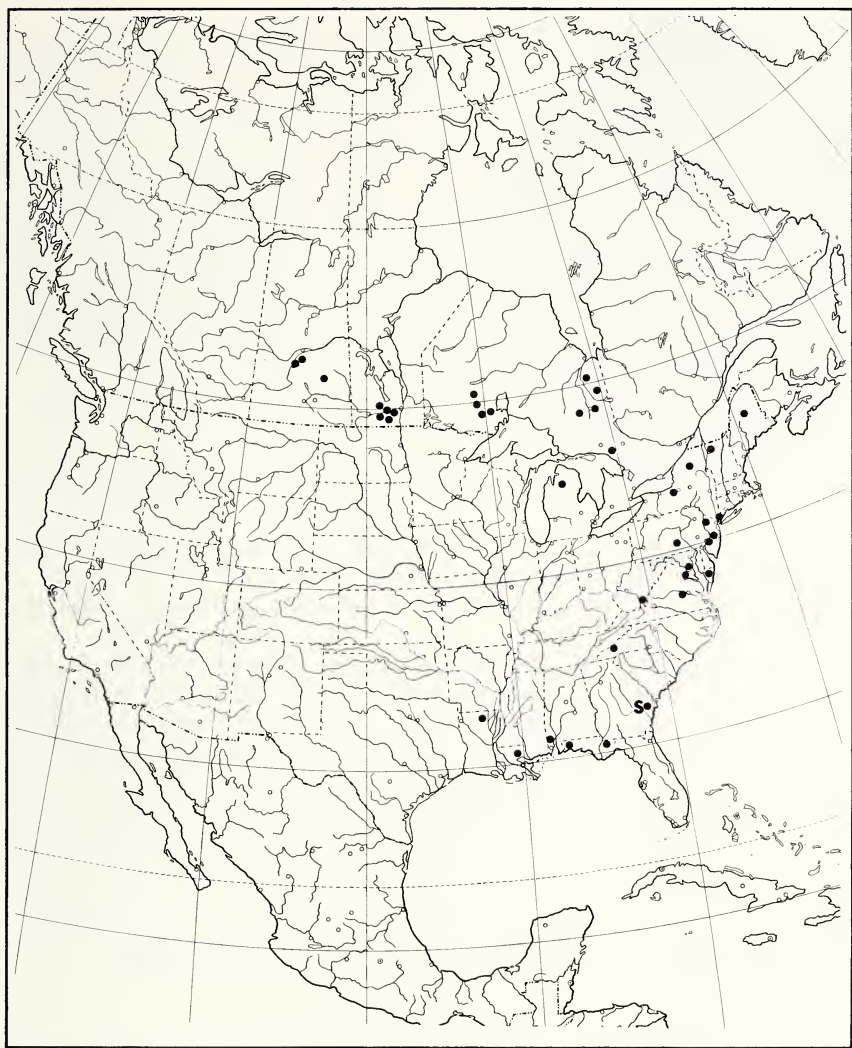


Fig. 355. Distribution. *Hyperaspis conviva*.

Hyperaspis conviva Casey
Fig. 354a-e; Map, Fig. 355

Hyperaspis conviva Casey, 1924, p. 163.—Korschefsky, 1931, p. 186.

Hyperaspis insolens Casey, 1924, p. 164.—Korschefsky, 1931, p. 190.

Hyperaspis binotata: Dobzhansky, 1941, p. 27 (in part).

Hyperaspis congressis Watson, 1960, p. 231.—Watson, 1969, p. 370. J. Chapin, 1974, p. 42. **New Synonymy.**

Diagnosis. Length 2.70 to 3.80 mm, width 2.0 to 2.60 mm. Form elongate, oval, usually somewhat parallel sided and dorsoventrally flattened, particularly in female. Color pattern as in *H. signata* (Fig. 354d, e). Postcoxal line not reaching hind margin of first abdominal sternum, somewhat flattened along margin. Male genitalia as in Figure 354a–c. Female genitalia as described for *H. signata*.

Discussion. This is the most easily recognized species in the *signata* group because of the dorsoventrally flattened, elongate form which is characteristic of most females and many of the males. The male genitalia are very peculiar because the asymmetry is reversed, presenting nearly a mirror image of the *H. signata* genitalia. The genitalia are also reversed in the abdomen, lying on the right side of the abdomen (in ventral view from apex) rather than the left side as they do in all other species of *Hyperaspis* that I have seen. *Hyperaspis conviva* is extremely widespread, and partially because of this, has been named 3 times. Dobzhansky (1941) placed *H. conviva* Casey and *H. insolens* Casey as junior synonyms of *H. binotata*. Watson (1960) described *H. congressis* as a new species because he had not seen the type of either *H. insolens* or *H. conviva*; I here place *H. congressis* as a junior synonym of *H. conviva*. The types of both *conviva* (female) and *insolens* (male) are uniques (holotypes) in the Casey collection.

Type locality. Of *conviva*, Southern Pines, North Carolina; of *insolens*, Grayling, near Bay City, Michigan; of *congressis*, Savanne, Ontario.

Type depository. Of *conviva* (35174) and *insolens* (35176), USNM; of *congressis*, CNC.

Distribution. Figure 355. MANITOBA: Beausejour; Fairford; Pine Falls; Reynolds; Sandilands Forest Reserve; Stead; Victoria. ONTARIO: Agawa; Fort William; German; Gogama; Hawk Lake; Lost Bay; McIntosh; Savanne; Walford. SASKATCHEWAN: Holbein; Hudson Bay; Prince Albert. ALABAMA: Mobile. DISTRICT OF COLUMBIA: Washington; Woodridge. FLORIDA: Pensacola; Tallahassee. LOUISIANA: East Baton Rouge Parish; Ouachita Parish; West Feliciana Parish. MAINE: Mt. Katahdin. MARYLAND: Beltsville; Priest Br. MICHIGAN: Bay City; Roscommon. NEW JERSEY: Clementon; Lakehurst; Pemberton; Riverton; Warren Co.; Westville. NEW YORK: Brooklyn; Top of Mt. Whiteface; Seneca Co., Willard. NORTH CAROLINA: Tryon. PENNSYLVANIA: Harrisburg. VIRGINIA: Gum Spring; Rosslyn; Wallops Id. WEST VIRGINIA: White Sulphur Springs.

bigeminata group

Male genitalia with paramere broad, almost spoon-shaped, basal lobe deeply concave on one side, angulate on other side (Fig. 356a); female spermathecal capsule with appendix short (Fig. 357d).

The bulk of the species in Section I belong to this group which is well characterized by the type of male genitalia.

Hyperaspis gemina LeConte

Fig. 356a–d; Map, Fig. 358

Hyperaspis gemina LeConte, 1880, p. 188.—Casey, 1899, p. 128.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 189.—Dobzhansky, 1941, p. 37.

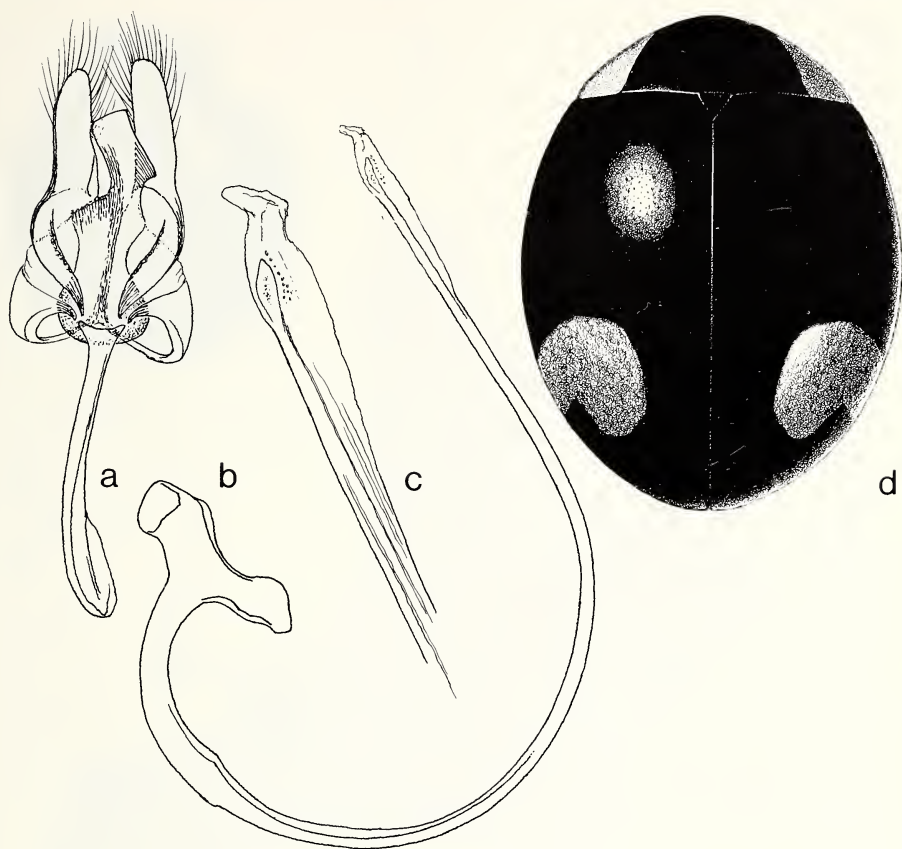


Fig. 356. *Hyperaspis gemina*.

Diagnosis. Length 2.80 to 4.0 mm, width 2.10 to 3.0 mm. Form oval, convex. Apical margin of clypeus truncate. Head yellow, pronotum with broad lateral area yellow in both sexes. Elytron with 2 narrowly connected yellow spots at apex (Fig. 356d). Postcoxal line evenly curved, except outer $\frac{1}{3}$ slightly angulate, nearly reaching hind margin of first abdominal sternum, area within line smooth, impunctate. Male genitalia as in Figure 356a-c.

Discussion. This rarely collected species is unusual in having the clypeal apex truncate and the head yellow in both sexes. There are 2 types of *H. gemina* in the LeConte collection, one of these labeled "Ga./Type 6713(red paper)/*H. gemina* Lec.", I here designate and label as the lectotype. The other specimen labeled "Tex." is designated and labeled as a paralectotype.

Type locality. Georgia (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 358. NORTH CAROLINA: Bell Island; Wenona. SOUTH CAROLINA: Myrtle Beach. VIRGINIA: Cape Henry; Ft. Monroe.

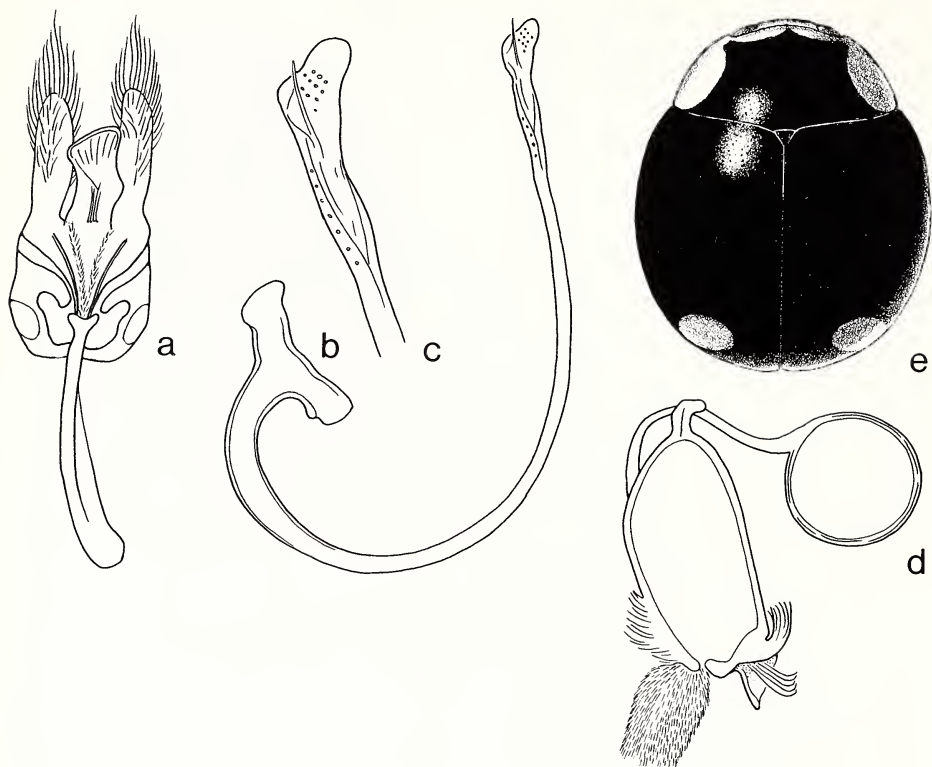


Fig. 357. *Hyperaspis bigeminata*.

Hyperaspis bigeminata (Randall)

Fig. 357a-e; Map, Fig. 358

Coccinella bigeminata Randall, 1838a, p. 32.—Mulsant, 1850, p. 1050.

Hyperaspis bigeminata LeConte, 1852, p. 135.—Crotch, 1873, p. 380.—Crotch, 1874b, p. 234.—LeConte, 1880, p. 188.—Wickham, 1894, p. 304.—Casey, 1899, p. 122.—Blatchley, 1910, p. 523.—Korschefsky, 1931, p. 185.—Dobzhansky, 1941, p. 36.—Wingo, 1952, p. 26.—J. Chapin, 1974, p. 43.

Hyperaspis guexi Mulsant, 1850, p. 687.—Crotch, 1873, p. 380.

Diagnosis. Length 2.40 to 3.35 mm, width 2.0 to 2.70 mm. Form oval, convex. Pronotum of male with anterior margin and broad lateral area yellow; pronotum of female with anterior margin black, broad lateral area yellow. Elytron with single yellow or red apical spot (Fig. 357e). Postcoxal line reaching hind margin of first abdominal sternum, evenly curved, area within line smooth, distinctly punctured. Male genitalia as in Figure 357a-c. Female genitalia as in Figure 357d.

Discussion. The apical position of the spot on the elytron is usually sufficient to distinguish *H. bigeminata* from similar appearing species of *Hyperaspis*. A single

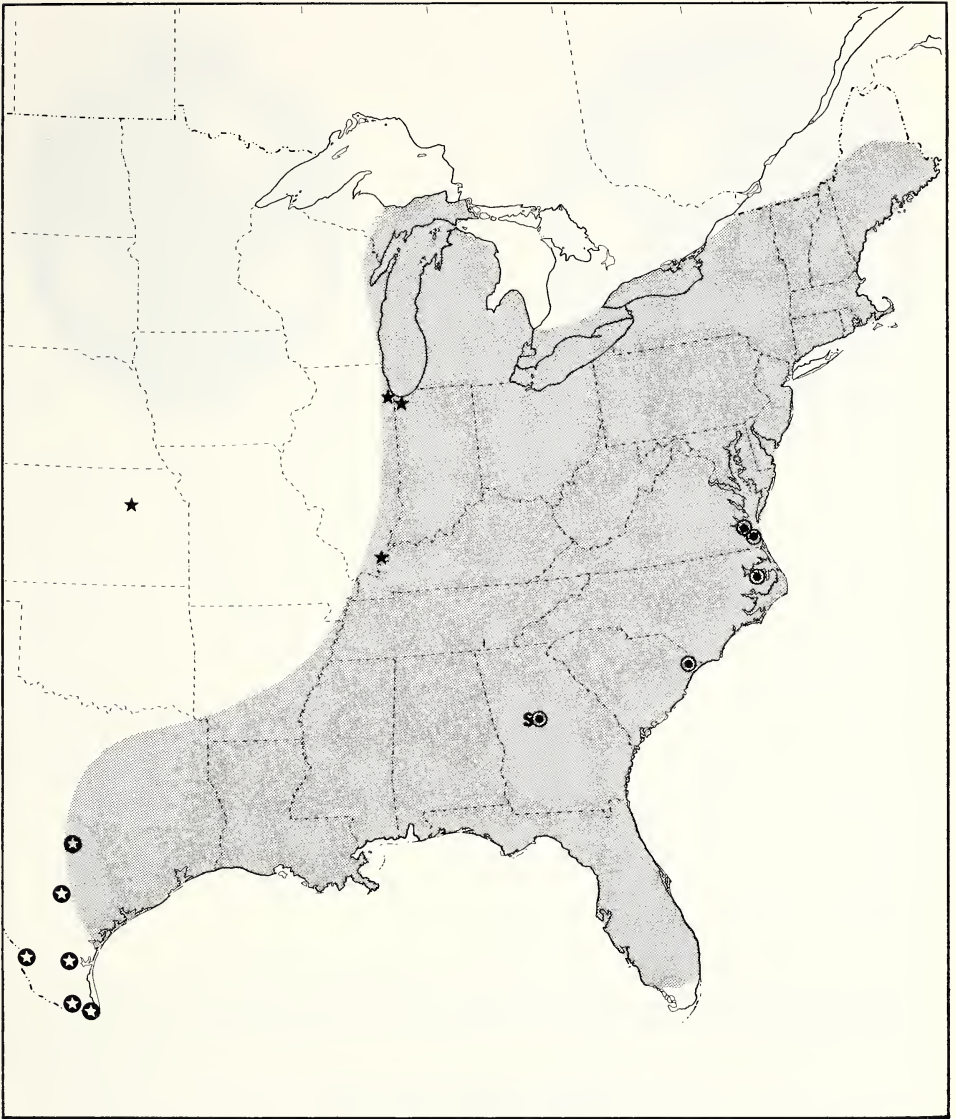


Fig. 358. Distribution. *Hyperaspis gemina* (circled dot); *H. bigeminata* (shaded); *H. wickhami* (circled star); *H. major* (star).

male type of *H. guexi* exists in the Dejean collection labeled "Ameri. bor., LeConte." I here designate and label this specimen as the lectotype. The type of *H. bigeminata* has not been located and may be either lost or not recognizable.

Type locality. Of *bigeminata*, Blue Mountains, Maine; of *guexi*, "Ameri. bor." (lectotype were designated).

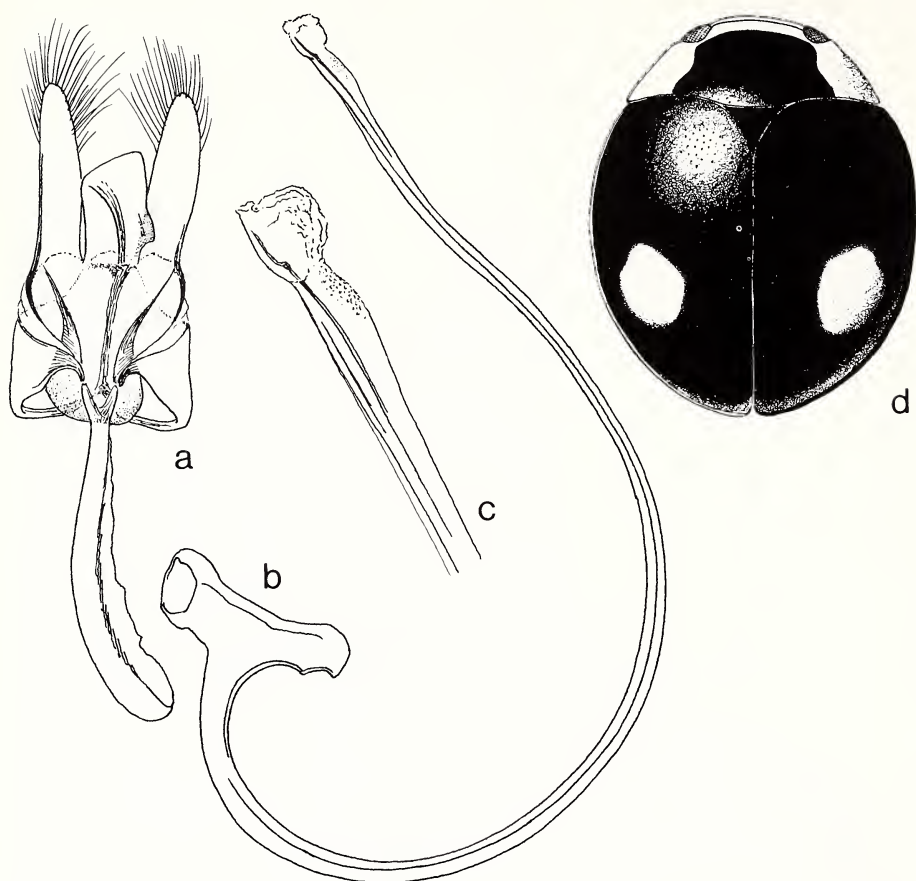


Fig. 359. *Hyperaspis wickhami*.

Type depository. Of *bigeminata*, not located; of *guexi*, DLM.

Distribution. Figure 358. Maine to Florida, west to Michigan and east Texas.

Hyperaspis wickhami Casey
Fig. 359a-d; Map, Fig. 358

Hyperaspis wickhami Casey, 1899, p. 124.

Hyperaspis centralis Mulsant: Bowditch, 1902, p. 207.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 186.

Hyperaspis centralis wickhami: Dobzhansky, 1941, p. 33.

Diagnosis. Length 2.80 to 3.50 mm, width 1.60 to 2.0 mm. Form rounded, slightly oval, convex. Pronotum of male with anterior margin and very broad lateral area yellow; pronotum of female with anterior margin black, lateral area yellow. Elytron

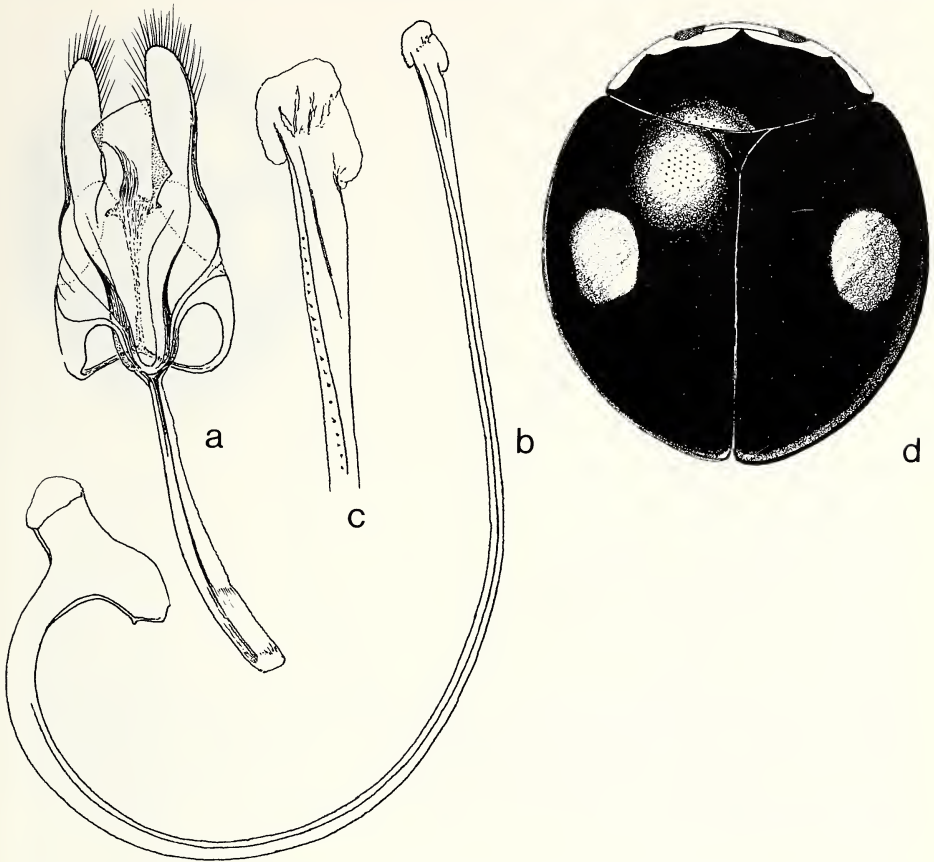


Fig. 360. *Hyperaspis major*.

with single large yellow or orange spot behind middle (Fig. 358d). Postcoxal line reaching hind margin of first abdominal sternum, evenly curved except outer $\frac{1}{3}$ angulate, area within line smooth, sparsely, feebly punctured. Male genitalia as in Figure 358a-c.

Discussion. This species most closely resembles *H. bicentralis* which also occurs in the same general region, but the lateral area of the pronotum is broadly yellow in both sexes of *H. wickhami* and narrowly yellow in the male and black in the female of *H. bicentralis*. There are 6 types (all males) of *H. wickhami* in the Casey collection. I here designate and label the first of these as the lectotype, the remainder as paralectotypes.

Type locality. Brownsville, Texas (lectotype here designated).

Type depository. USNM (35171).

Distribution. Figure 358. TEXAS: Austin; Brownsville; Laredo; San Antonio; San Diego; Weslaco.

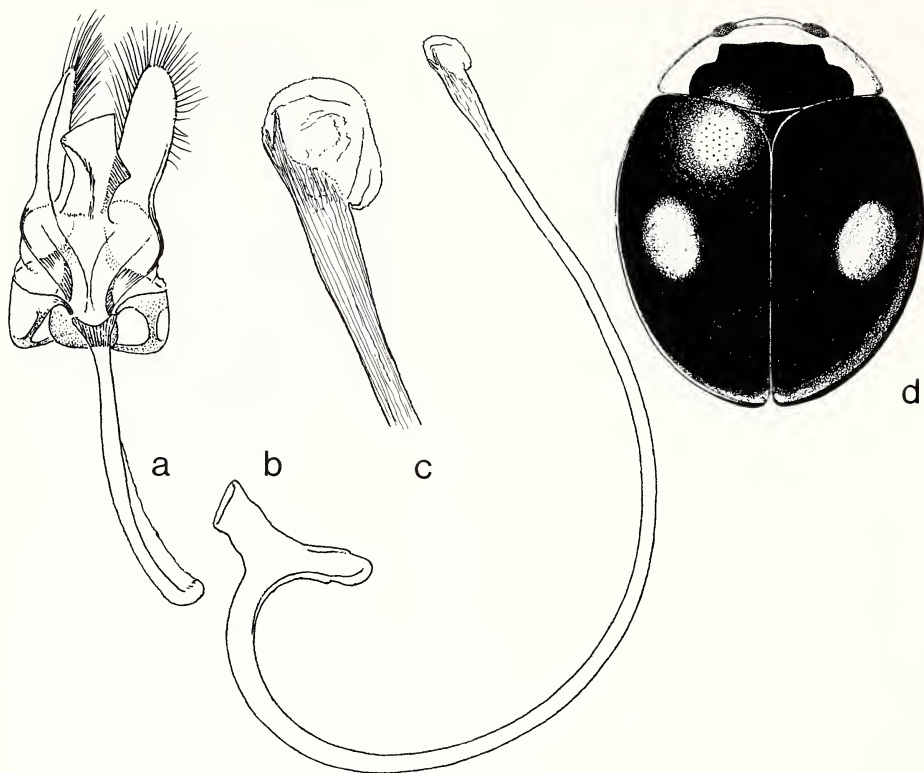


Fig. 361. *Hyperaspis concavus*.

Hyperaspis major Dobzhansky
Fig. 360a-d; Map, Fig. 358

Hyperaspis bicentralis major Dobzhansky, 1941, p. 33.—Wingo, 1950, p. 26.

Hyperaspis congeminata Watson, 1969, p. 368. **New Synonymy.**

Diagnosis. Length 3.50 to 3.70 mm, width 3.0 to 3.10 mm. Form rounded, convex. Pronotum of male with anterior margin and narrow lateral area yellow; pronotum of female entirely black. Elytron with single yellow or red discal spot (Fig. 360d), or with additional small apical spot. Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved throughout, area within line smooth, distinctly punctured. Male genitalia as in Figure 360a-c.

Discussion. This species is not at all related to *H. bicentralis* as supposed by Dobzhansky (1941). The male genitalia (which Dobzhansky did not examine) are clearly of the *bigeminata* type. This is another species in which the genitalia are of one type and the external color pattern typical of another group. *Hyperaspis major* will be confused with members of the *binotata* and *signata* groups, especially *H. signata* and *H. pistillata* because the dorsal color pattern is of that type rather than



Fig. 362. Distribution. *Hyperaspis concavus* (dot); *H. lugubris* (circle); *H. lewisi* (star).

the *bigeminata* type. Male genitalia must be examined in this instance. *Hyperaspis congeminata* Watson is a junior synonym of *H. major*. Watson (1969) remarked that *H. congeminata* resembled *H. major*, but since Dobzhansky (1941) had not examined the male genitalia of *H. major*, no genitalic comparison was possible.

Type locality. Of *major*, Riverside, Illinois; of *congeminata*, Karber's Ridge, Illinois.

Type depository. Of *major*, USNM (54203); of *congeminata*, INHS.

Distribution. Figure 358. INDIANA: Hammond. ILLINOIS: Riverside. KANSAS: Manhattan.

Hyperaspis concavus Watson

Fig. 361a–d; Map, Fig. 362

Hyperaspis concavus Watson, 1969, p. 367.

Diagnosis. Length 2.60 to 3.50 mm. width 2.0 to 2.75 mm. Form oval, convex. Pronotum of male black, anterior margin broadly yellow, broad lateral area yellow, apex of black area truncate; pronotum of female entirely black. Elytron with single orange spot on disc (Fig. 361d). Postcoxal line nearly reaching hind margin of first abdominal sternum, evenly curved throughout, area within line smooth with scattered fine punctures. Male genitalia as in Figure 361a–c.

Discussion. Females of this species are not separable from females of most of the other 2-spotted species having entirely black pronota, but the male pronotal pattern with reduced and apically truncate black areas is distinctive.

Type locality. Summit of Mt. Washington, 6,293 feet, New Hampshire.

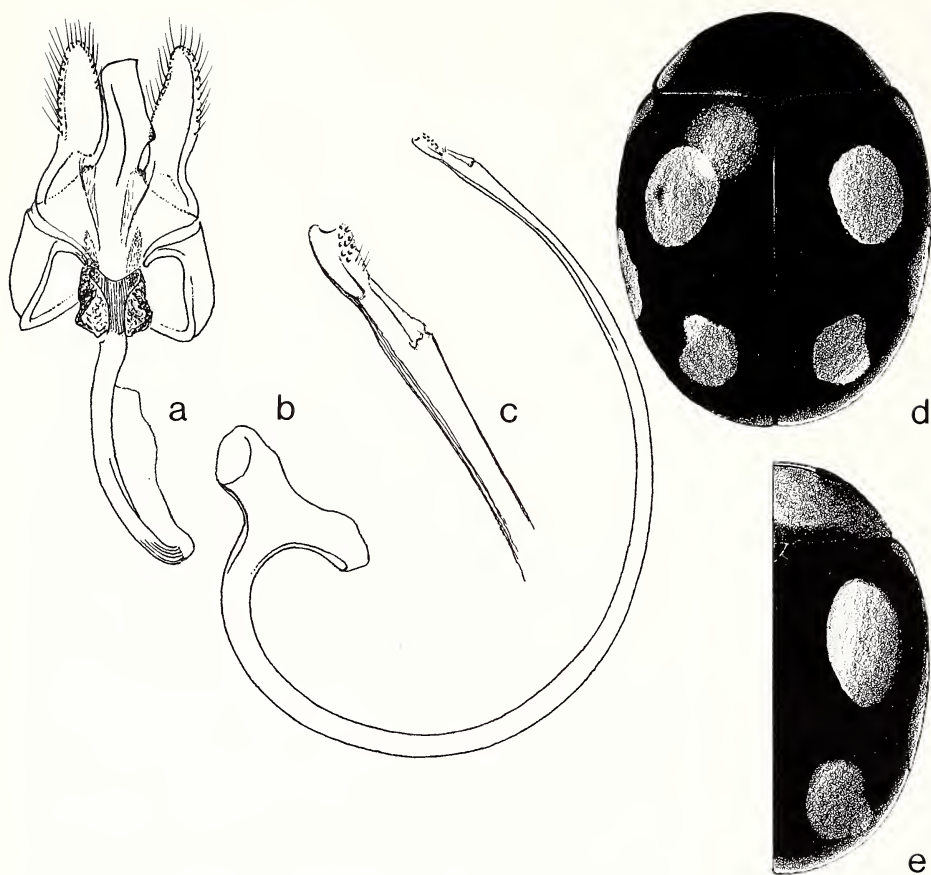


Fig. 363. *Hyperaspis lugubris*.

Type depository. UMMZ.

Distribution. Figure 362. NEW YORK: Ithaca; Top of Mt. Whiteface.

Hyperaspis lugubris (Randall)

Fig. 363a-e; Map, Fig. 362

Coccinella lugubris Randall, 1838b, p. 52.—Mulsant, 1850, p. 1051.

Hyperaspis lugubris LeConte, 1852, p. 134.—LeConte, 1880, p. 188.—Crotch, 1873, p. 380.—Crotch, 1874b, p. 233.—Casey, 1899, p. 128.—Leng, 1920, p. 212.—Korschevsky, 1931, p. 192.—Dobzhansky, 1941, p. 21.—Wingo, 1952, p. 25.—Belicek, 1976, p. 316.

Hyperaspis jucunda LeConte, 1852, p. 134 (not Mulsant, 1850).—Crotch, 1874b, p. 233.

Hyperaspis lecontei Crotch, 1874b, p. 233 (new name for *jucunda* LeConte).—Casey, 1899, p. 128.

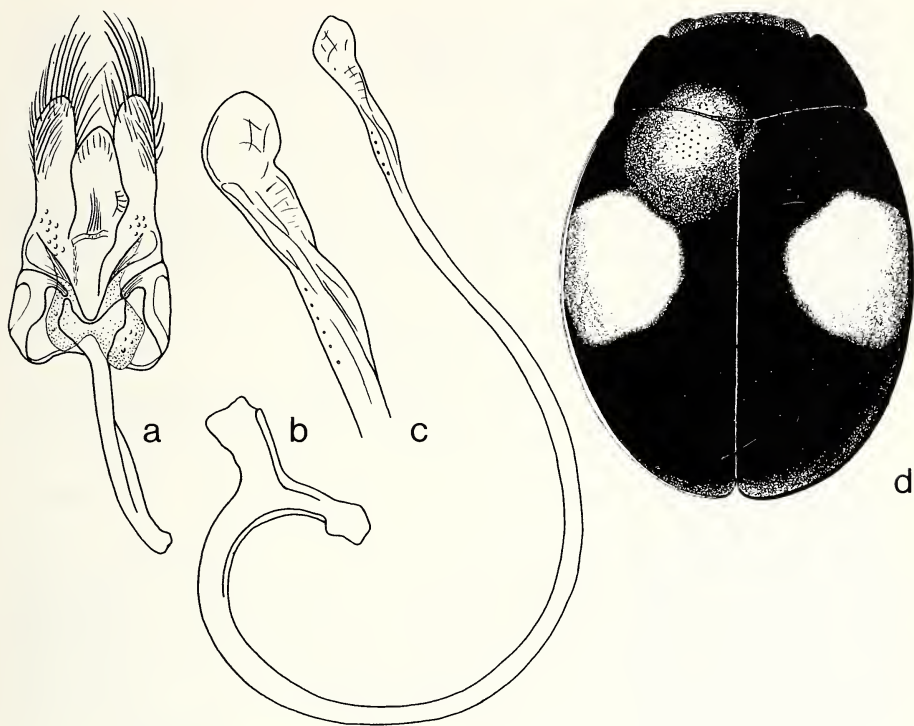


Fig. 364. *Hyperaspis lewisi*.

Hyperaspis separata Casey, 1924, p. 165.—Korschefsky, 1931, p. 195.—Dobzhansky, 1941, p. 21.

Diagnosis. Length 2.40 to 3.30 mm, width 1.60 to 2.40 mm. Form elongate, oval, convex. Pronotum of male reddish yellow, often with narrow black or darkened area in front of scutellum; female head yellow, pronotum mostly black with yellow lateral margin, anterior margin often narrowly yellow. Elytron with 3 spots, discal, apical, and lateral; lateral spot on margin from base to apical $\frac{1}{3}$ (Fig. 363d, e). Postcoxal line nearly reaching hind margin of first abdominal sternum, flattened along hind margin, outer $\frac{1}{3}$ straight, area within line alutaceous, finely, indistinctly punctured. Male genitalia as in Figure 363a–c.

Discussion. This species is peculiar in that the male pronotum is usually entirely pale, and the female pronotal pattern would be that of the male in most other North American species of *Hyperaspis*. The elongate form, pronotal color pattern and arrangement of elytral spots is a combination not shared by any other species of *Hyperaspis* from the eastern United States. *Hyperaspis venustula* Mulsant, placed as a synonym of this species by Dobzhansky (1941), was transferred to *Hyperaspis* by Gordon (1974c).

The type of *jucunda* is a unique (holotype) male labeled “(yellow disc)”—male sign/

Type 6715(red paper)/*H. lugubris* (Rand.) *jucunda* Lec. "The type of *separata* is a unique female (holotype) in the Casey collection.

Type locality. Of *lugubris*, Cambridge, Massachusetts; of *jucunda*, "Illinois"; of *separata*, Natick, Massachusetts.

Type depository. Of *lugubris*, type not located; of *jucunda*, MCZ; of *separata*, USNM (35201).

Distribution. Figure 362. COLORADO: Marshall. IOWA: Iowa City; Madison Co. KANSAS: Topeka. MINNESOTA: Itasca Park; Plummer. NEBRASKA: Scottsbluff. NEW YORK: West Point. NORTH DAKOTA: Grant Co., Lake Tschida. PENNSYLVANIA: Wind Gap.

Hyperaspis lewisi Crotch

Fig. 364a-d; Map, Fig. 362

Hyperaspis lewisii Crotch, 1873, p. 380.—LeConte, 1880, p. 187.—Casey, 1899, p. 128.—Korschefsky, 1931, p. 191.—Dobzhansky, 1941, p. 30.—Wingo, 1952, p. 25.

Hyperaspis maneei Casey, 1924, p. 163.—Korschefsky, 1931, p. 192.—Dobzhansky, 1941, p. 30.

Diagnosis. Length 3.0 to 3.80 mm, width 2.10 to 2.50 mm. Form elongate, nearly parallel sided, not strongly convex. Pronotum of male with anterior margin and narrow lateral area yellow; pronotum of female entirely black. Elytron with large, yellow, discal spot extending from or near lateral margin nearly to suture (Fig. 364d). Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved except slightly flattened along hind margin, area within line smooth, distinctly punctured. Male genitalia as in Figure 364a-c.

Discussion. The elongate form and large yellow spot on each elytron cause *H. lewisi* to be one of the most readily recognized species in the *bigeminata* group. The type of *H. maneei* in the Casey collection is a unique female (holotype). The Crotch type or types of *H. lewisi* should be in the LeConte collection and indeed there are 2 specimens there under that name, one of these labeled "type 8246." There are, however, certain discrepancies that make me doubt that either of these specimens are types. Crotch's type locality was "United States", but both of these specimens are labeled "Tex." Crotch distinctly described a male specimen, but both of these are females. Although there is no doubt that both the LeConte specimens are indeed *H. lewisi*, I do not believe that either of them are types.

Type locality. Of *lewisi*, "United States," of *maneei*, Southern Pines, North Carolina.

Type depository. Of *lewisi*, see preceding discussion; of *maneei*, USNM (35175).

Distribution. Figure 362. DISTRICT OF COLUMBIA: Washington. FLORIDA: De Funiak Spring. KENTUCKY: Louisville. MARYLAND: Great Falls. NEW YORK: Bear Mtn.; West Point.

Hyperaspis lateralis Mulsant

Fig. 365a-h; Map, Fig. 366

Hyperaspis lateralis Mulsant, 1850, p. 657.—Crotch, 1873, p. 379.—LeConte, 1880, p. 187.—Gorham, 1894, p. 195.—Casey, 1899, p. 122.—Nunenmacher, 1911, p.

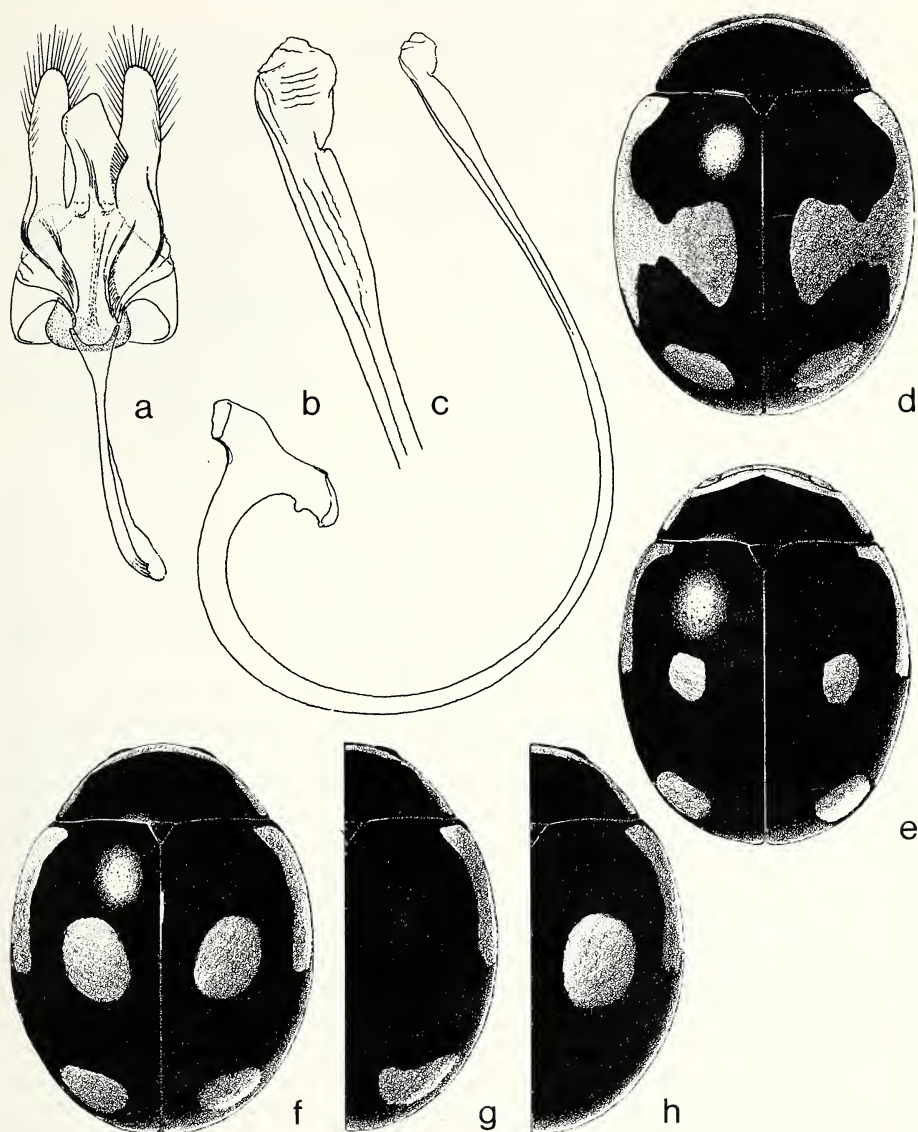


Fig. 365. *Hyperaspis lateralis*.

- 73.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 191.—Wingo, 1952, p. 25.—Hatch, 1961, p. 156.—J. Chapin, 1974, p. 40.—Belicek, 1974, p. 311.
Hyperaspis lateralis lateralis Dobzhansky, 1941, p. 15.
Hyperaspis montanica Casey, 1899, p. 122.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 192.—Belicek, 1976, p. 311.

Hyperaspis lateralis montanica Dobzhansky, 1941, p. 16.

Hyperaspis laevipennis Casey, 1899, p. 122.—Bowditch, 1902, p. 207.—Korschefsky, 1931, p. 191.—Dobzhansky, 1941, p. 15.

Hyperaspis lateralis var. *omissa* Casey, 1879, p. 122. **New Synonymy.**

Hyperaspis omissa Korschefsky, 1931, p. 191.

Hyperaspis lateralis omissa: Dobzhansky, 1941, p. 18.

Hyperaspis lateralis var. *flammula* Nunenmacher, 1911, p. 72. **New Synonymy.**

Hyperaspis pinguis ab. *flammula*: Leng., 1920, p. 211.—Korschefsky, 1931, p. 191.

Hyperaspis lateralis flammula: Dobzhansky, 1941, p. 17.

Hyperaspis wellmani Nunenmacher, 1911, p. 72.—Korschefsky, 1931, p. 199.

Hyperaspis lateralis wellmani: Dobzhansky, 1941, p. 18.—Belicek, 1976, p. 311.

Hyperaspis idae Nunenmacher, 1912, p. 450.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 190.

Hyperaspis lateralis idae: Dobzhansky, 1941, p. 19.—Belicek, 1976, p. 312.

Hyperaspis lateralis nigrocauda Dobzhansky, 1941, p. 17. **New Synonymy.**

Diagnosis. Length 2.50 to 3.80 mm, width 2.10 to 3.0 mm. Form oval, convex. Pronotum of male with anterior margin and narrow lateral area yellow; pronotum of female entirely black. Color pattern of elytron variable (Fig. 365d-h), but usually with an extended subhumeral spot as in Figure 365e. Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved, area within line polished, sparsely, finely punctured. Male genitalia as in Figure 365a-c.

Discussion. Most examples of this species can be recognized because the broad subhumeral spot on the elytron extends from the base to approximately $\frac{2}{3}$ the length of the elytron. Those specimens not having this type of spot are difficult to identify without examining the male genitalia. Many names have been proposed for the color variants of *H. lateralis*, but none of these are applied to well characterized geographic races. In almost all instances a sizeable population of *H. lateralis* contains 2 or more of these variants as pointed out by Dobzhansky (1941) and El-Ali (unpubl. dissertation). There is no doubt that the Florida and Louisiana specimens are *H. lateralis* even though they are widely disjunct from the normal distribution pattern. In this case I suspect an accidental introduction, perhaps via commerce, but no evidence is available as to the origin of the introduction. Belicek (1976) synonymized *H. montanica*, *H. wellmani*, and *H. idae* with *H. lateralis*, but incorrectly stated that this had previously been done by Dobzhansky (1941). I here consider *H. omissa* Casey, *H. flammula* Nunenmacher, and *H. nigrocauda* Dobzhansky to be junior synonyms of *H. lateralis* rather than subspecies. A single female type of *H. lateralis* exists in the Sicard collection labeled "Type/coll. Mniszech/lateralis Muls. Mexique Type." I here designate and label this specimen as the lectotype of *lateralis*. There are 3 types of *H. montanica* in the Casey Collection, the first of which I here designate and label as the lectotype, the others as paralectotypes. *Hyperaspis laevipennis* is represented in the Casey collection by a unique male type (holotype). There are 2 type specimens of *H. omissa*, the first of which, a male, I designate and label as the lectotype, the remaining specimen as a paralectotype. Nunenmacher had 3 type specimens of *H. flammula*, I have seen 2 of these and designate a male labeled "Mon/male sign/ Hyperaspis v. flammula Nun." as the lectotype. Nunenmacher had 7 type

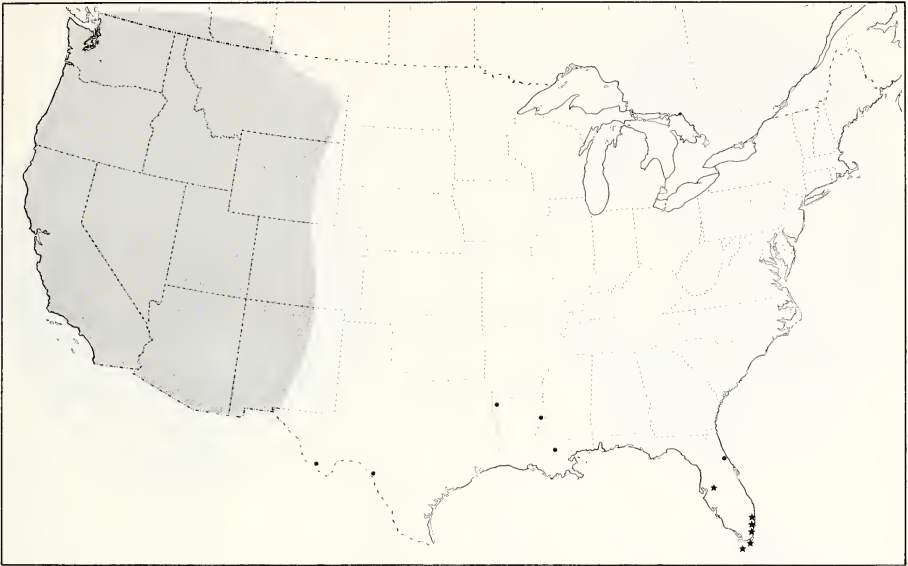


Fig. 366. Distribution. *Hyperaspis lateralis* (shaded, disjunct localities dotted); *H. ornatella* (star).

specimens of *H. wellmani*, I have seen 2 of these and designate a male labeled "Goldfield/Esmeralda Co. Nev. VI.27.02/coll'd by F. W. Nunenmacher/*Hyperaspis wellmani* Nun." as the lectotype. Nunenmacher had a type and one "cotype" of *idae* labeled "Humboldt Co. Cal. IV.25.11/coll'd by F. W. Nunenmacher/male sign/ *Hyperaspis idae* Nun." Hatch (1961) used the name *H. lateralis* ab. *craterensis* which has no standing because it was used as an aberration.

Type locality. Of *lateralis*, "Mexique" (lectotype here designated); of *montanica*, Helena, Montana (lectotype here designated); of *laevipennis*, Gilroy Hot Springs, Santa Clara Co., California; of *omissa*, Canyon of Colorado River, Arizona (lectotype here designated); of *nigrocauda*, Canon City, Colorado; of *flammula*, "Montana" (lectotype here designated); of *wellmani*, Goldfield, Esmeralda Co., Nevada (lectotype here designated); of *idae*, Humboldt Co., California.

Type depository. Of *lateralis*, PM; of *montanica* (35149), *laevipennis* (35150), *omissa* (35152), and *nigrocauda* (54202), USNM; of *flammula*, *wellmani*, and *idae*, CAS.

Distribution. Figure 366. Montana to New Mexico, west to British Columbia and southern California. Peripheral localities; El Paso and Del Rio, Texas. Disjunct localities: DeLand, Florida; Caddo, East Baton Rouge, and Tensas Parishes, Louisiana.

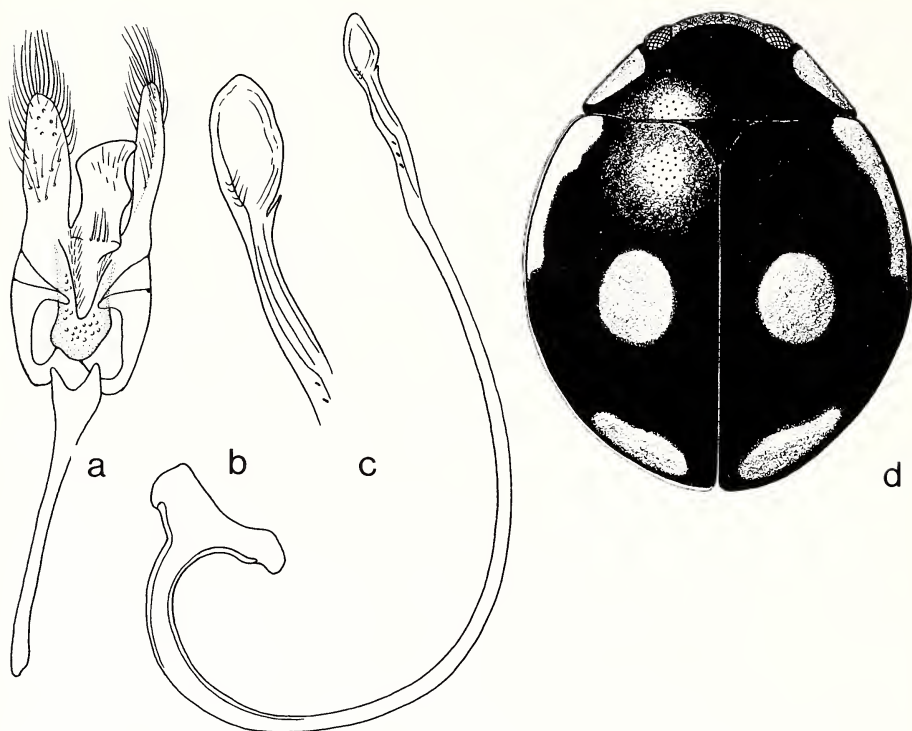


Fig. 367. *Hyperaspis pinguis*.

Hyperaspis pinguis Casey
Fig. 367a-d; Map, Fig. 369

Hyperaspis pinguis Casey, 1899, p. 122.—Bowditch, 1902, p. 207.—Korschefsky 1931, p. 191.

Hyperaspis lateralis: Leng, 1920, p. 211.—Belicek, 1976, p. 311 (in part).

Hyperaspis lateralis lateralis: Dobzhansky, 1941, p. 15.

Diagnosis. Length 3.30 to 3.50 mm, width 2.60 to 2.70 mm. Description as for *H. lateralis* except pronotum of male with broad lateral area yellow; female pronotum with large, triangular lateral area yellow; elytron with subhumeral spot large, reaching humeral callus (Fig. 367d). Male genitalia as in Figure 367a-c.

Discussion. Bowditch (1902) first considered *H. pinguis* a junior synonym of *H. lateralis* and Dobzhansky (1941) followed this placement. I have examined the genitalia of the male type of *H. pinguis* and find that they are quite different from those of *H. lateralis*. Because of the genitalia and external differences listed above I regard *H. pinguis* as a valid species. There are 2 types of *H. pinguis* in the Casey collection and I here designated and label the first of these (male) as the lectotype, the second as a paralectotype.

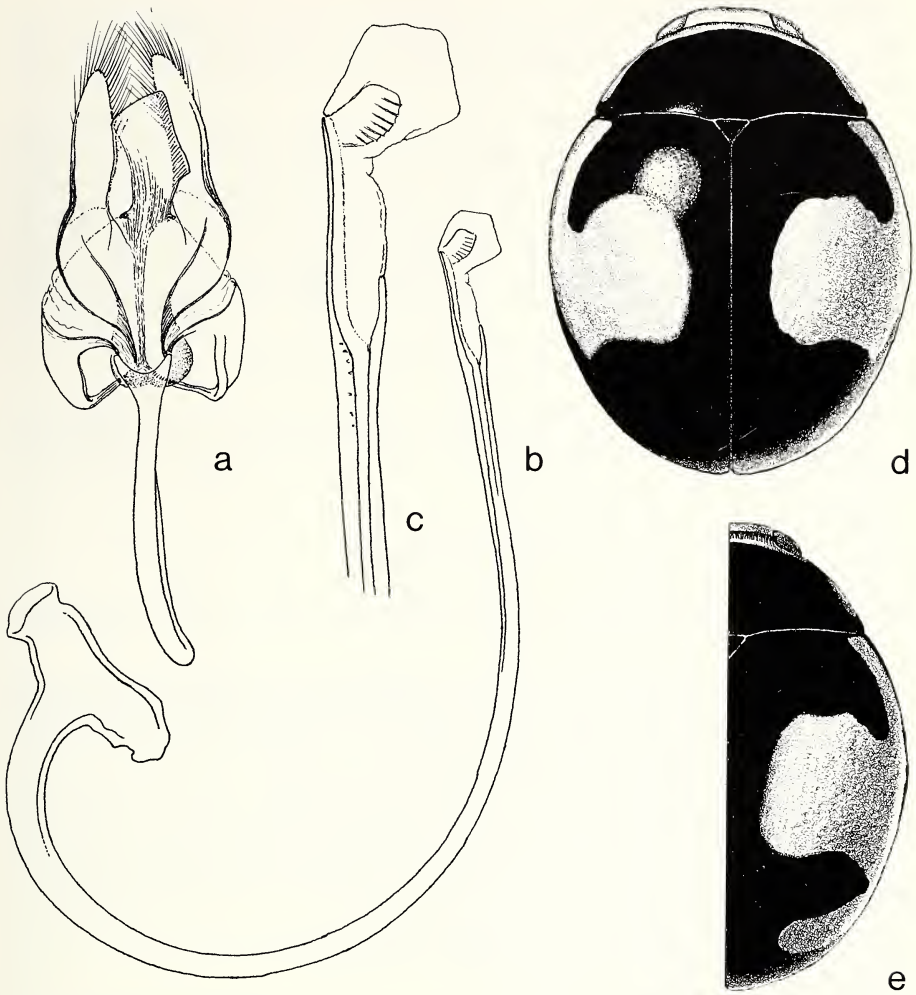


Fig. 368. *Hyperaspis excelsa*.

Type locality. Arizona (lectotype here designated).

Type depository. USNM (35151).

Distribution. Figure 369. ARIZONA: Cochise Co., Douglas; Patagonia; Santa Catalina Mts.; Santa Cruz Co., Nogales; Tucson; Tucson Mts.

Hyperaspis excelsa Fall
Fig. 368a-e; Map, Fig. 369

Hyperaspis excelsa Fall, 1901, p. 232.—Leng, 1920, p. 211.—Korschevsky, 1931, p. 188.—Dobzhansky, 1941, p. 20.

Diagnosis. Length 3.40 to 4.20 mm, width 2.60 to 3.50 mm. Description as for *H. lateralis* except elytron with subhumeral spot connected to large discal spot (Fig. 368d), apical spot sometimes present (Fig. 368e). Male genitalia as in Figure 368a-c.

Discussion. This species may be a junior synonym of *H. lateralis*, but I have seen only 6 specimens of *H. excelsa* and prefer not to synonymize it at this time without being able to judge the range of variability. There are also minor differences in the male genitalia of the two species. I have seen 2 type specimens of *H. excelsa* and designate and label a male bearing the label "Pomona Cal 11.3.94/Type excelsa/M.C.Z. Type 24540 (red paper) H. C. Fall collection" as the lectotype. A female with the same locality data in the USNM collection is designated and labeled as a paralectotype.

Type locality. Pomona, California (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 369. CALIFORNIA: Anaheim; El Monte; Los Angeles; Los Angeles Co., Camp Baldy; Mint Canyon; Pomona; San Antonio; San Bernardino Co., Fontana.

Hyperaspis pluto Fall

Map, Fig. 369

Hyperaspis pluto Fall, 1925, p. 311.—Korschefsky, 1931, p. 194.—Dobzhansky, 1941, p. 85.

Diagnosis. Length 3.50 to 3.75 mm. Form rounded, convex. Male unknown. Pronotum of female black except lateral margin narrowly reddish yellow. Elytron entirely black. Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved, area within line polished, sparsely, finely punctured.

Discussion. The entirely black elytron and large size make *H. pluto* our most easily recognized species of *Hyperaspis*. Only 4 examples have been seen, all of these females, therefore the placement of this species in the *bigeminata* group is tentative. The holotype is a female labeled "S. Bdo. Mts. Cal. 6000 ft. 7-3-17/pluto type/M.C.Z. Type 24543 (red paper)/H. C. Fall Collection."

Type locality. San Bernardino Mountains, California.

Type depository. MCZ.

Distribution. Figure 369. CALIFORNIA: Inyo Co., Westgard Pass Plateau.

Hyperaspis ornatella, new species

Fig. 370a-d; Map, Fig. 366

Description. Male, length 2.60 mm, width 2.10 mm. Form oval, somewhat rounded, slightly flattened dorsoventrally. Head yellow. Pronotum yellow with large, rectangular black area medially. Elytron black with large, median yellow spot in apical 1/3 (Fig. 370d). Punctures on head fine, separated by a diameter or less; pronotal punctures slightly coarser than on head, separated by a diameter or less; punctures on elytron coarser than on pronotum, separated by one to 2 times a diameter. Metasternum finely punctured medially, punctures becoming coarse laterally. Abdominal

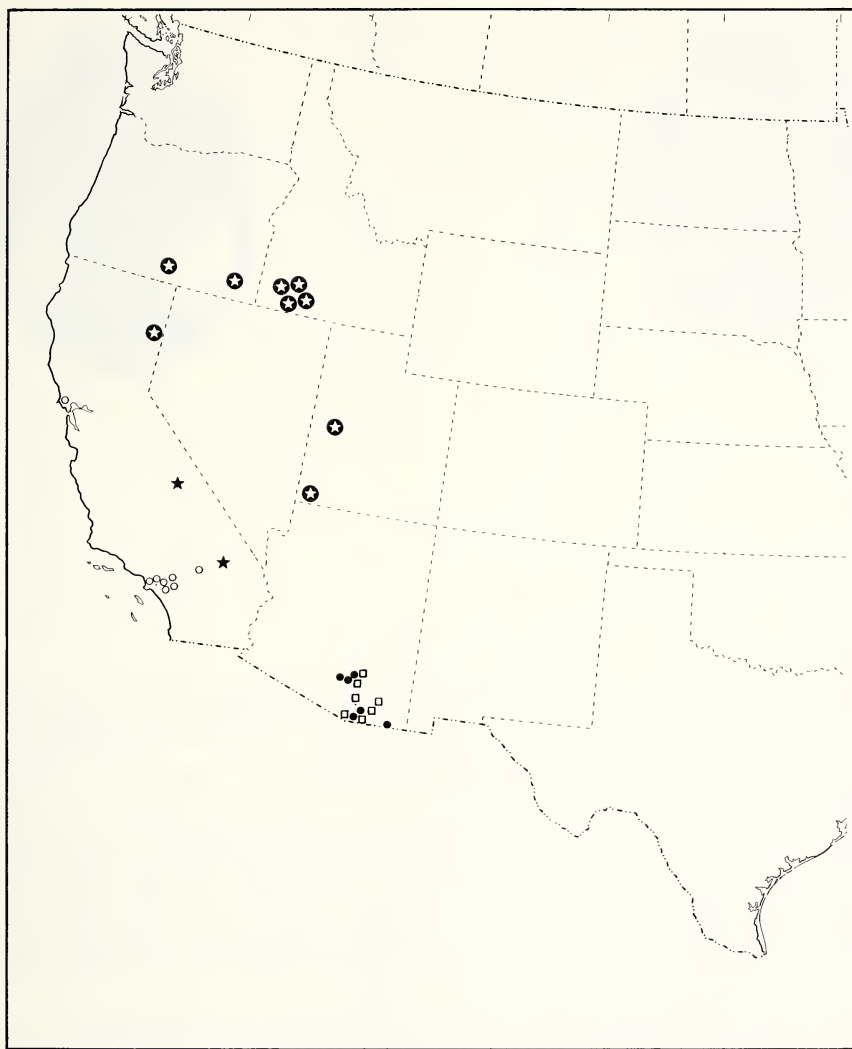


Fig. 369. Distribution. *Hyperaspis pinguis* (dot); *H. excelsa* (open circle); *H. pluto* (star); *H. oculifera* (square); *H. chapini* (circled star).

sterna coarsely punctured throughout, punctures separated by a diameter medially, nearly contiguous laterally. Postcoxal line reaching hind margin of first abdominal sternum, flattened along margin, area within line polished, with sparse, coarse punctures. Genitalia as in Figure 370a–c.

Female, length 2.40 mm, width 1.80 mm. Similar to holotype except head black; pronotum with median black area extending to anterior margin.

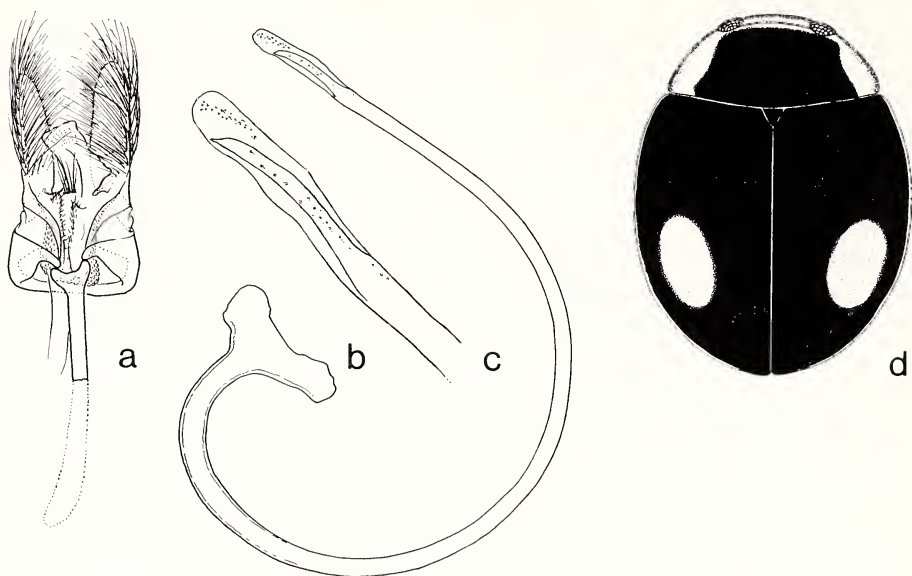


Fig. 370. *Hyperaspis ornatella*.

Variation. Length 2.30 to 2.85 mm, width 1.70 to 2.10 mm.

Holotype. Male. FLORIDA: Dade Co., Hialeah, 21-VII-71, C.E. Stegmaier, Jr. reared from aphids ex. *Malphigia glabra* L. (FSCA).

Allotype. Female. FLORIDA: Key Vaca, 28-XII-55, H. V. Weems, Jr., at *bidens pilosa*. (FSCA).

Paratypes. Total 20 (Fig. 366). FLORIDA: same data as holotype; same data as allotype; Broward Co., Pompano Beach, 30-V-77 and 6-VII-77, R. Schimmel; Dade Co., 15-X-57, R. W. Swanson; Dade Co., Miami, 1-IX-67, J. C. Haley; Dania, 25-V-62, D. P. B. McLean; Lakeland City, 14-II-99, D. Culbert, on *Juniperus chinensis*; Plantation Key, 29-X-57, H. A. Denmark, *Acalypha Wilkesiana*; South Miami, 19-III-65, R. W. Swanson; no data. (FSCA) (USNM).

This species has essentially the same color pattern as *H. oculifera* Casey, however, *oculifera* is strongly convex dorsolaterally, the postcoxal line on the first abdominal sternum is rounded and does not reach the hind margin, the average size is distinctly smaller than *H. ornatella*, and the anterior margin of the posternum is not toothed. No other Florida species of *Hyperaspis* has a color pattern similar to *H. ornatella*. This species may be an aphid predator because specimens of the type series from Dade Co., Hialeah, are labeled "reared from aphids ex *Malphigia glabra* L.". The specific name is from the Latin *ornamentum*, and refers to the distinctive color pattern.

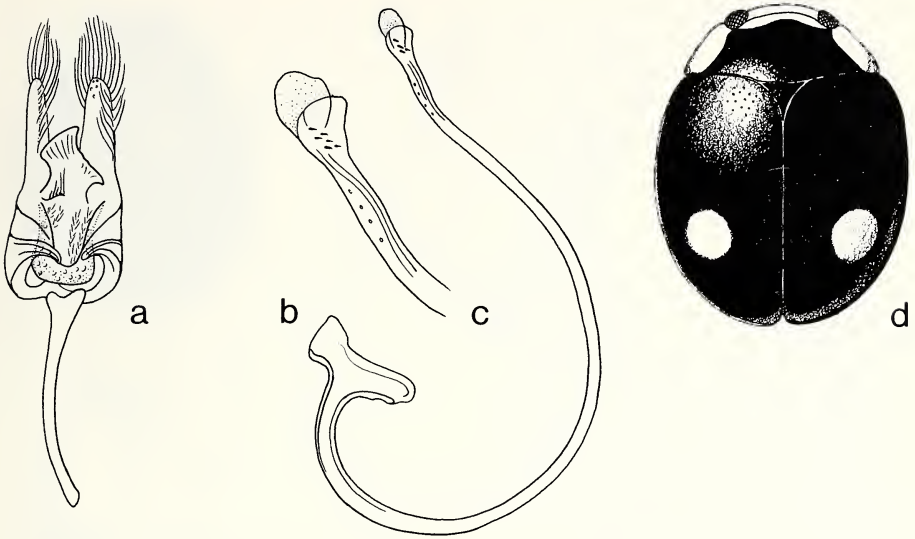


Fig. 371. *Hyperaspis oculifera*.

Hyperaspis oculifera Casey

Fig. 371a–d; Map, Fig. 369

Hyperaspis oculifera Casey, 1908, p. 415.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 193.—Dobzhansky, 1941, p. 35.

Diagnosis. Length 2.0 to 2.60 mm, width 1.60 to 2.0 mm. Form rounded, convex. Pronotum of male with anterior margin and broad lateral area yellow; pronotum of female with anterior margin black, broad lateral area yellow. Elytron with single yellow spot medially behind middle (Fig. 371d). Lateral $\frac{1}{3}$ of anterior margin of prosternum with row of teeth descending in size from lateral margin. Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved except slightly flattened along margin, area within line polished, distinctly punctured. Male genitalia as in Figure 371a–c.

Discussion. This little species is very distinctive because of the unusual toothed apical margin of the pronotum and the male genitalia which, although of the *bigeminata* type, have the basal lobe quite divergent from the normal form. The type of *oculifera* is a unique male (holotype) in the Casey collection. Dobzhansky (1941) was correct in comparing *H. centralis* Mulsant to *oculifera*. They are definitely related and very similar, but the male genitalia are distinctly different and *centralis* has the row of prosternal teeth reduced and shortened. A male type of *centralis* exists in the Crotch collection (UCCC) labeled "Type(blue paper)/TYPE/centralis Muls." I here designated and labeled this specimen as the lectotype.

Type locality. Benson, Cochise Co., Arizona.

Type depository. USNM (35177).

Distribution. Figure 369. ARIZONA: Nogales; Oracle; Pena Blanca Canyon, Pajarito Mts.; Pima Co., Pantano; Sabino Canyon; Santa Rita Mts.; Tombstone; Tucson.

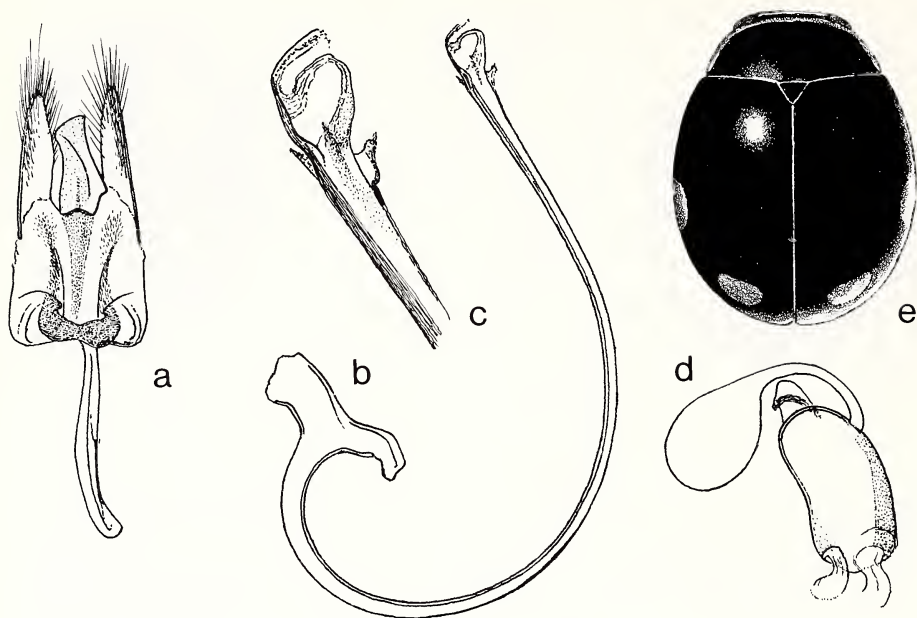


Fig. 372. *Hyperaspis chapini*.

Hyperaspis chapini Dobzhansky

Fig. 372a-e; Map, Fig. 369

Hyperaspis chapini Dobzhansky, 1941, p. 10.

Diagnosis. Length 2.0 to 2.75 mm, width 1.50 to 2.10 mm. Form rounded, slightly oval, convex. Pronotum of male with anterior margin and broad lateral area yellow; pronotum of female with anterior margin black, lateral yellow area reduced to narrow vitta. Elytron with 2 yellow spots, one at apex and one on lateral margin behind middle (Fig. 372e). Postcoxal line nearly reaching hind margin of first abdominal sternum, evenly curved except outer $\frac{1}{3}$ slightly angulate, area within line smooth, distinctly punctured. Male genitalia as in Figure 372a-c. Female genitalia as in Figure 372d.

Discussion. The elytral color pattern of *H. chapini* is similar to several species in Section II, but unique in Section I.

Type locality. Filer, Idaho.

Type depository. USNM (54200).

Distribution. Figure 369. CALIFORNIA: Amedee. IDAHO: Amsterdam; Bliss; Burley; Hagerman; Kimama. UTAH: Chad's Rch.; Delta. OREGON: Albert Lake; Harney Co., Tencent Lake; Lake Co., Paisley.

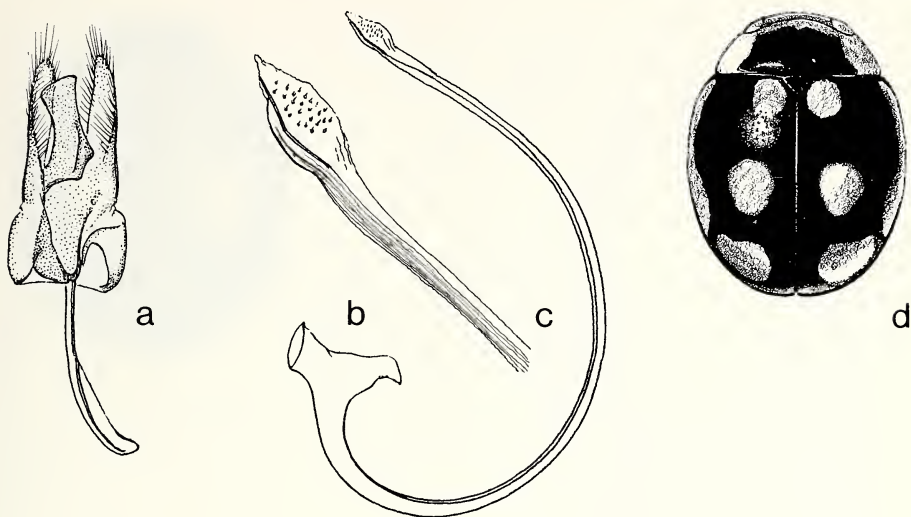


Fig. 373. *Hyperaspis levrati*.

Hyperaspis levrati (Mulsant)

Fig. 373a-d; Map, Fig. 375

Cleothera levrati Mulsant, 1850, p. 613.

Hyperaspis levrati: Gorham, 1894, p. 192.—Schaeffer, 1905, p. 145.—Korschefsky, 1931, p. 191.—Dobzhansky, 1941, p. 5.

Brachyacantha metator Casey, 1908, p. 413.

Hyperaspis metator: Casey, 1910, p. 109.—Leng, 1911, p. 8.—Korschefsky, 1931, p. 192.—Dobzhansky, 1941, p. 5.

Diagnosis. Length 2.20 to 3.0 mm, width 1.70 to 2.40 mm. Form rounded, slightly oval, convex. Pronotum of male with anterior margin and broad lateral area yellow; pronotum of female with anterior margin black, lateral yellow area smaller than in male. Elytron with 4 or 5 spots, normally 4 but subhumeral spot often divided (Fig. 373d). Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved, area within line smooth, feebly, indistinctly punctured. Male genitalia as in Figure 373a-c. Female genitalia as in *chapini*.

Discussion. The dorsal color pattern of *H. levrati* is unique in the North American fauna except for some specimens of *H. revocans*, however, the latter species is consistently smaller and less robust with different male genitalia. The type of *Brachyacantha metator* is a unique female (holotype) in the Casey collection.

There are 2 "types" of *levrati* in the BMNH, but Mulsant (1850) stated that his specimens were in the Dupont and Hope collections. The BMNH specimens, labeled "Named by Mulsant" are very likely to be type material, but I have not designated a lectotype in this case.

Type locality. Of *levrati*, "Mexique", of *metator*, Del Rio, Texas.

Type depository. Of *levrati*, BMNH?, of *metator*, USNM (35153).

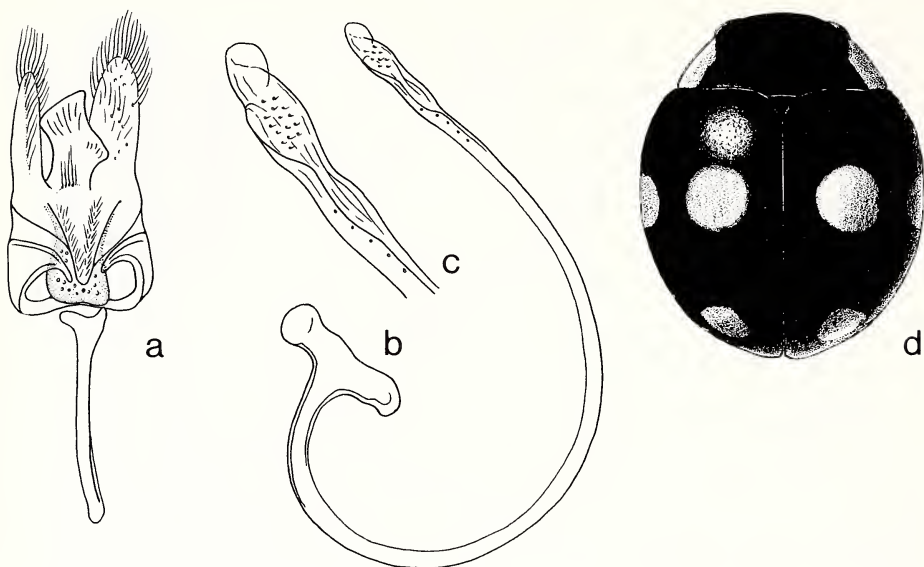


Fig. 374. *Hyperaspis deludens*.

Distribution. Figure 375. ARIZONA: Cochise Co., Palmerly; Santa Rita Mts.; Tucson. COLORADO: Canon City. TEXAS: Del Rio.

***Hyperaspis deludens*, new species**

Fig. 374a-d; Map, Fig. 375

Hyperaspis pratensis auct. (not *pratensis* LeConte, 1852).—Wingo, 1952, p. 25 (in part).

Hyperaspis pratensis pratensis: Dobzhansky, 1941, p. 11 (in part).

Description. Female, length 2.60 mm, width 2.10 mm. Form rounded, convex. Head black; pronotum black with large yellow area on lateral margin; elytron black with 3 yellow spots, discal, apical and marginal (Fig. 374d). Punctures on head fine, separated by 3 or 4 times a diameter; punctures on elytron coarse, larger than on head, separated by slightly more than a diameter. Metasternum with very coarse, almost confluent punctures becoming slightly finer medially. Abdominal sterna with fine, dense punctures except first sternum with coarse, sparse punctures. Postcoxal line reaching hind margin of first abdominal sternum, evenly curved except outer $\frac{1}{3}$ straight, area within line alutaceous, impunctate.

Male. Similar to holotype except head yellow; length 2.40 mm, width 2.0 mm; genitalia as in Figure 374a-c.

Holotype. Female. ILLINOIS: "Southern", 6/890, Collection H. Soltau (USNM 101338).

Allotype. Male. OHIO: (state record), Collection H. Soltau (USNM).

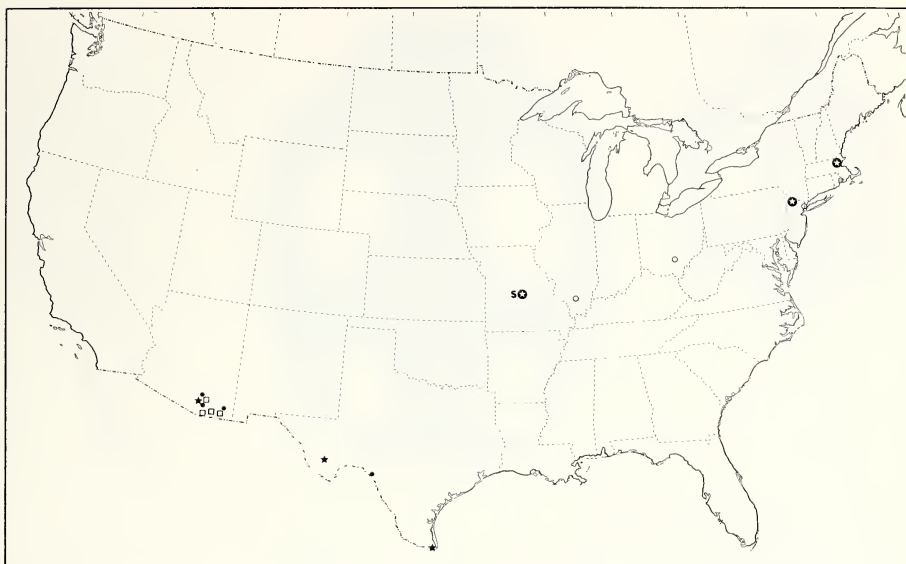


Fig. 375. Distribution. *Hyperaspis levrati* (dot); *H. deludens* (open circle); *H. pratensis* (circled star); *H. medialis* (star); *H. aemulator* (square).

Paratypes. Total 2 (Fig. 375). New York: Mosholu. OHIO: Hocking Co., IV-26-38, D. J. + J. N. Knull (CAS).

This species has been confused with *H. pratensis* LeConte because they have the same unique arrangement of elytral spots. However, *H. pratensis* is larger and has the elongate, convex form of some species of *Brachiacantha* as pointed out by LeConte (1852). The very round form and 3 spotted elytron make *H. deludens* a distinctive species. The specific name means to deceive, referring to the deceptive resemblance to *H. pratensis*.

Hyperaspis pratensis LeConte

Fig. 376; Map, Fig. 375

Hyperaspis pratensis LeConte, 1852, p. 134.—LeConte, 1880, p. 188.—Crotch, 1873, p. 380.—Crotch, 1874b, p. 234.—Casey, 1899, p. 128.—Schaeffer, 1908, p. 126.—Blatchley, 1910, p. 523.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 194.—Wingo, 1952, p. 25 (in part).

Hyperaspis pratensis pratensis: Dobzhansky, 1941, p. 11 (in part).

Diagnosis. Length 2.60 mm, width 2.85 mm. Form elongate, slightly oval, convex. Pronotum with broad yellow area laterally. Elytron with 3 large yellow spots (Fig. 376). Postcoxal line reaching hind margin of first abdominal sternum, evenly rounded except outer $\frac{1}{3}$ straight, area within line smooth, finely, sparsely punctured. Male genitalia unknown.

Discussion. This species has the habitus of some species of *Brachiacantha*, differing

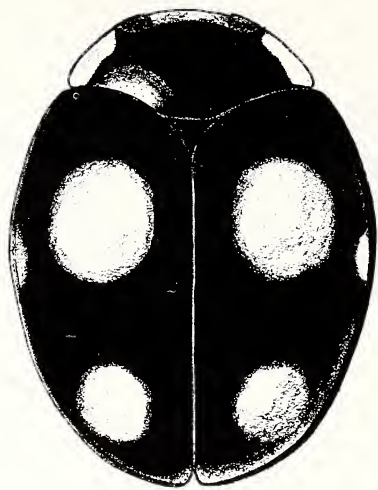


Fig. 376. *Hyperaspis pratensis*.

greatly from most other species of *Hyperaspis* in this respect (see remarks under *H. deludens*, n. sp.). Dobzhansky (1941) placed *Hyperaspis triplicans* Casey and *H. triplicans microsticta* Casey as junior synonyms of *H. pratensis*, but examination of the types shows that both belong in the genus *Brachiacantha*. The holotype of *pratensis* is a unique female labeled "green disc/TYPE 6714(red paper)/*H. pratensis* Lec."

Type locality. Missouri.

Type depository. MCZ.

Distribution. Figure 375. NEW JERSEY: Hoptacong. MASSACHUSETTS: Beach Bluff.

Hyperaspis medialis Casey

Fig. 377 a-d; Map, Fig. 375

Hyperaspis medialis Casey, 1899, p. 123.—Schaeffer, 1905, p. 145.—Korschefsky, 1931, p. 196.

Hyperaspis pratensis medialis: Dobzhansky, 1941, p. 11.

Hyperaspis sexverrucata: Leng, 1920, p. 211.

Diagnosis. Length 2.00 to 2.50 mm, width 1.60 to 1.80 mm. Form rounded, slightly oval, convex. Dorsal color pattern as described for *H. pratensis* except yellow spots on elytron longer (Fig. 377d). Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved, area within line smooth, impunctate. Male genitalia as in Figure 377a-c.

Discussion. Dobzhansky (1941) regarded *medialis* as a subspecies of *pratensis* (*deludens*), but I cannot agree with this placement, I have seen *H. medialis* only from Brownsville and Alpine, Texas, and *pratensis* (*deludens*) from no farther south or

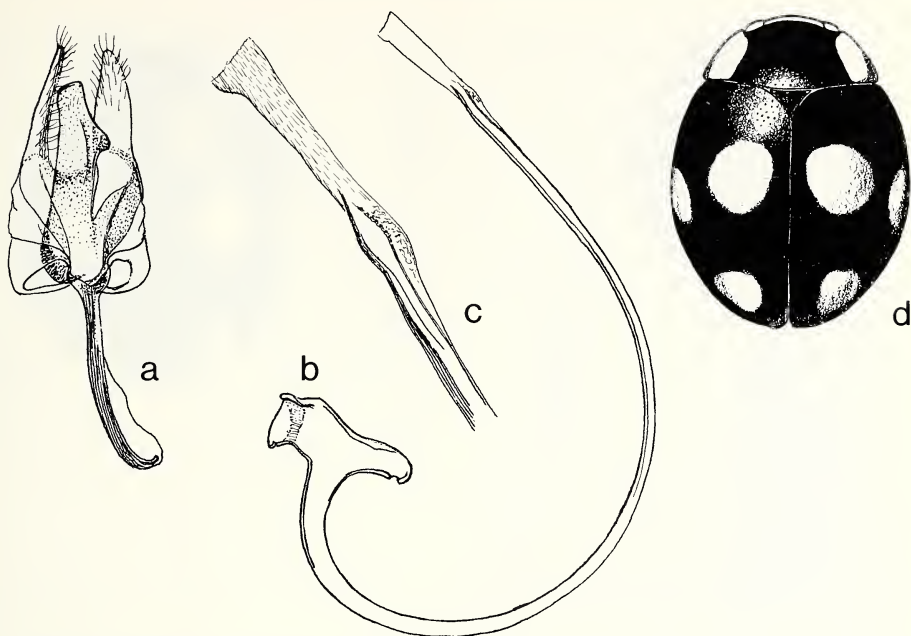


Fig. 377. *Hyperaspis medialis*.

west than Missouri. The male genitalia are distinctive in both species as well as the size of the elytral spots and body shape. Therefore I consider *H. medialis* a valid species. There are 5 types of *H. medialis* in the Casey collection and I here designate and label the first of these (male) the lectotype, the remainder as paralectotypes.

Type locality. Brownsville, Texas (lectotype here designated).

Type depository. USNM (35160).

Distribution. Figure 375. ARIZONA: Molino Basin; S. Catalina Mts. TEXAS: Alpine; Brownsville.

Hyperaspis aemulator Casey

Fig. 378a-d; Map, Fig. 375

Hyperaspis aemulator Casey, 1908, p. 413.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 184.

Hyperaspis pratensis aemulator: Dobzhansky, 1941, p. 12.

Diagnosis. Length 2.40 to 2.80 mm, width 2.0 to 2.30 mm. Form rounded, slightly oval. Dorsal color pattern similar to *H. medialis* (Fig. 378d). Postcoxal line as described for *H. medialis*. Male genitalia as in Figure 378a-c.

Discussion. This species is very similar to *H. medialis* externally except that it is uniformly longer. Dobzhansky (1941) consider *aemulator* to be a subspecies of *pratensis* (*deludens*), but the male genitalia of *aemulator* are distinct from those of either

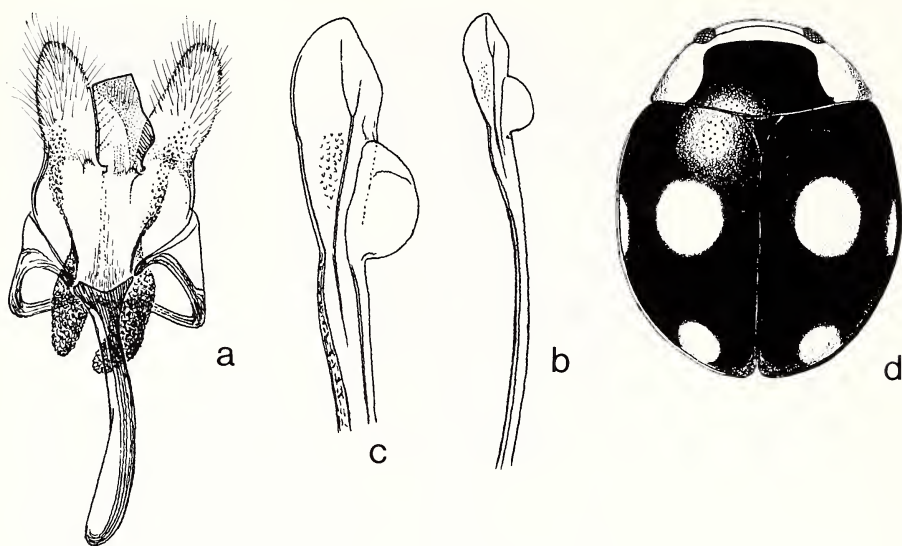


Fig. 378. *Hyperaspis aemulator*.

pratensis (*deludens*) or *medialis*, therefore I consider *H. aemulator* a valid species. The unique type (holotype) is a female in the Casey collection.

Type locality. Nogales, Santa Cruz Co., Arizona.

Type depository. USNM (35159).

Distribution. Figure 375. ARIZONA: Cochise Co., Palmerly; Huachuca Mts.; Santa Rita Mts.

Hyperaspis revocans Casey
Fig. 379a-e; Map, Fig. 380

Hyperaspis revocans Casey, 1908, p. 419.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 195.

Hyperaspis revocans revocans: Dobzhansky, 1941, p. 6.

Hyperaspis revocans occidentalis Dobzhansky, 1941, p. 6. **New Synonymy.**

Diagnosis. 2.0 to 2.40 mm, width 1.50 to 1.80 mm. Form evenly convex. Head yellow in both sexes. Pronotum of male yellow with large, black, semicircular spot on base; pronotum of female black with yellow anterior and lateral margin. Color pattern of elytron variable; marginal vitta broad, complete or narrowly interrupted near apex, basal and discal spots present or one or both absent, often connected where both present (Fig. 379d, e). Postcoxal line reaching hind margin of first abdominal sternum, slightly flattened along margin, area within line smooth, sparsely punctured. Male genitalia as in Figure 379a-c.

Discussion. The paired basal spots of the elytra, especially when united with the discal spots, make *H. revocans* easily recognizable. The occasional specimen that

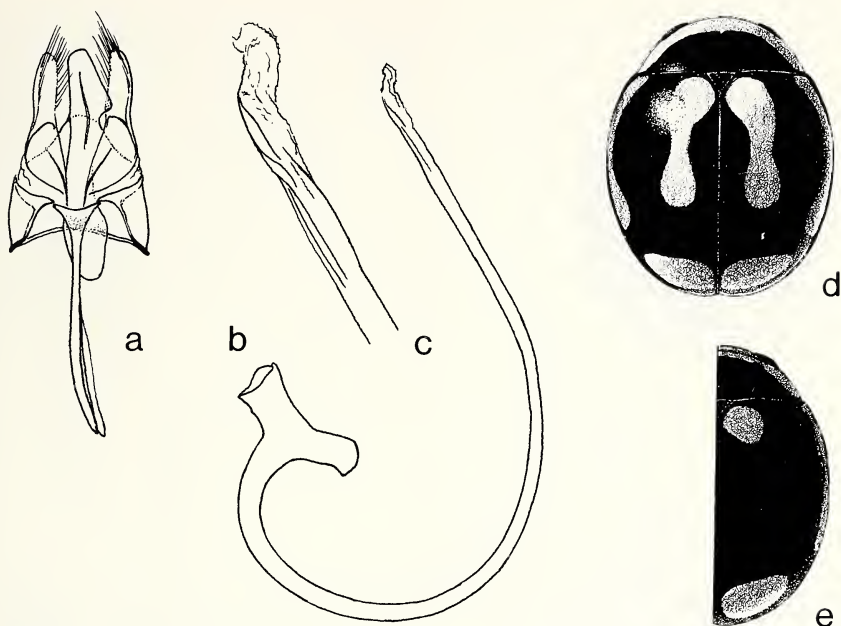


Fig. 379. *Hyperaspis revocans*.

lacks both spots or has only the discal spot is more difficult to place without examining male genitalia. *Hyperaspis occidentalis* is a junior synonym of *revocans* and cannot be maintained even as a subspecies. Both typical *revocans* and typical *occidentalis* occur together at St. George, Utah, and the male genitalia of both forms are identical. The type of *revocans* is a unique (holotype) male in the Casey collection.

Type locality. Of *revocans*, St. George, Utah; of *occidentalis*, Kettleman City, California.

Type depository. Of *revocans*, USNM (35206); of *occidentalis*, CAS.

Distribution. Figure 380. ARIZONA: Hot Springs. CALIFORNIA: Imperial Co., Fort Yuma; Indio; Kern Co.; Kings Co.; San Bernardino Co., Sacramento Spring at Klinefelter. NEW MEXICO: Mesilla Pk. UTAH: St. George.

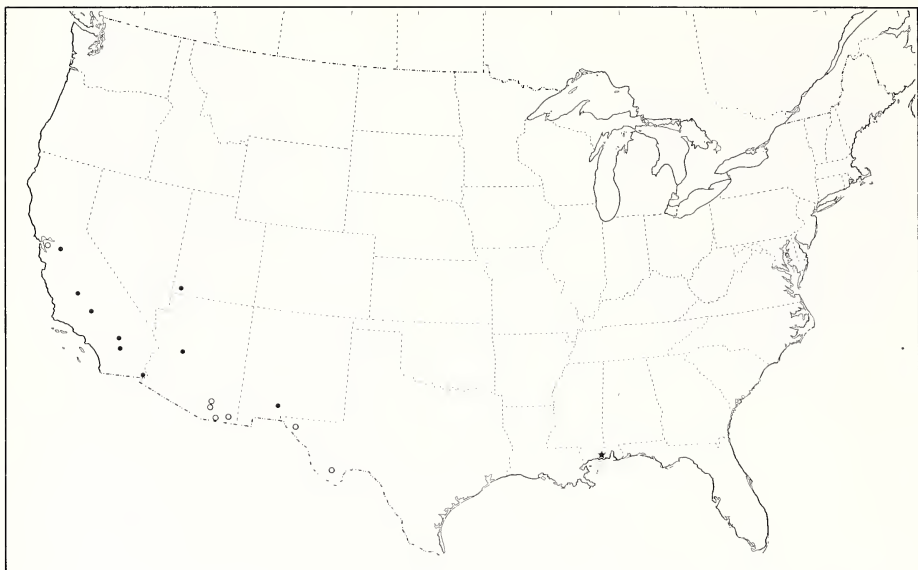


Fig. 380. Distribution. *Hyperaspis revocans* (dot); *H. triangulum* (open circle); *H. esclavium* (star).

Hyperaspis triangulum Casey

Fig. 381a-d; Map, Fig. 380

Hyperaspis triangulum Casey, 1899, p. 123.—Korschefsky, 1931, p. 198.—Dobzhansky, 1941, p. 71.

Diagnosis. Length 2.0 to 2.50 mm, width 1.60 to 1.90 mm. Form oval, convex. Pronotum in both sexes with lateral margin narrowly yellow. Elytron with 3 yellow spots (Fig. 381d). Postcoxal line reaching hind margin of first abdominal sternum, angulate in outer $\frac{1}{3}$, area within line densely punctured. Male genitalia as in Figure 381a-c.

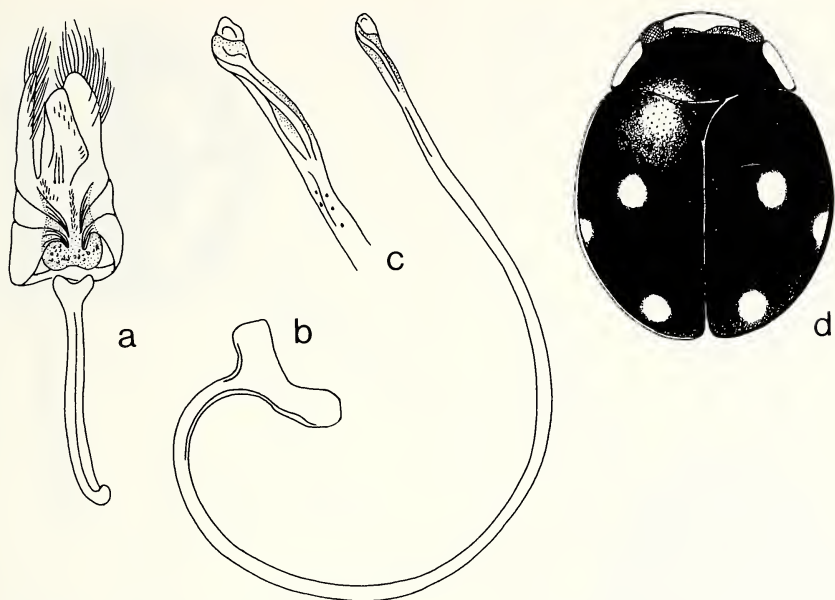


Fig. 381. *Hyperaspis triangulum*.

Discussion. The elytral color pattern of *H. triangulum* is quite distinctive, especially among members of Section I. Dobzhansky (1941) associated this species with *quadrioculata* which is in Section II. The type of *H. triangulum* is a unique male (holotype) in the Casey collection.

Type locality. Benson, Arizona.

Type depository. USNM (35202).

Distribution. Figure 380. ARIZONA: Cochise Co., Johnson; Huachuca Mts.; Santa Catalina Mts.; Tucson. CALIFORNIA: Contra Costa Co., Richmond. TEXAS: Davis Mts.; Finlay.

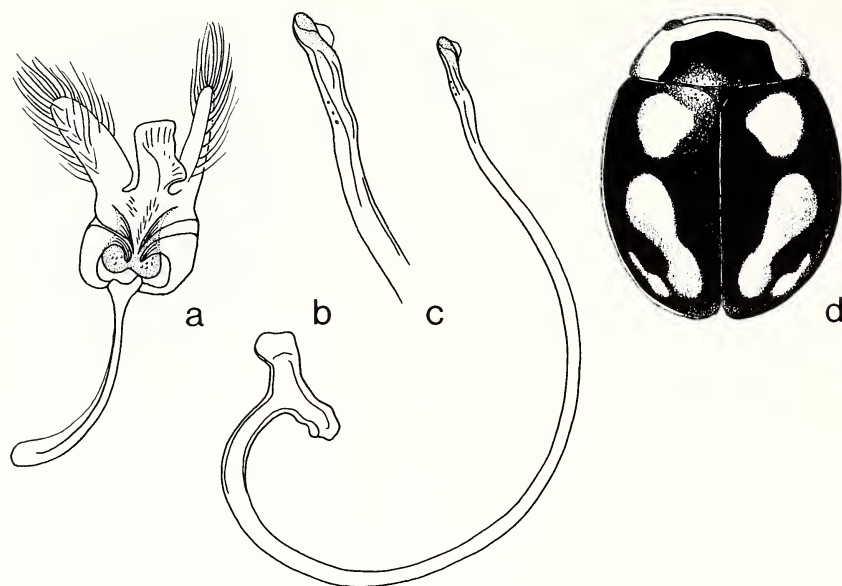


Fig. 382. *Hyperaspis esclavium*.

Hyperaspis esclavium Dobzhansky

Fig. 382a-d; Map, Fig. 380

Hyperaspis esclavium Dobzhansky, 1941, p. 82.

Diagnosis. Length 2.20 to 2.60 mm, width 1.70 to 2.0 mm. Form oval, convex. Pronotum of male with anterior margin and basal lateral area yellow; pronotum of female with anterior margin black, large lateral area yellow. Elytron with 4 yellow spots, spots often partially connected (Fig. 382d). Postcoxal line nearly reaching hind margin of first abdominal sternum, evenly curved, area within line densely punctured. Male genitalia as in Figure 382a-c.

Discussion. The only specimens seen have been the type series. This species is either extremely localized and rare, or the specimens comprising the type series were introduced or the offspring of an introduction. I suspect that the latter possibility is the most likely, and that a breeding population of the species may no longer occur in the United States.

Type locality. Biloxi, Mississippi.

Type depository. USNM (54221).

Distribution. Figure 380. MISSISSIPPI: Biloxi.

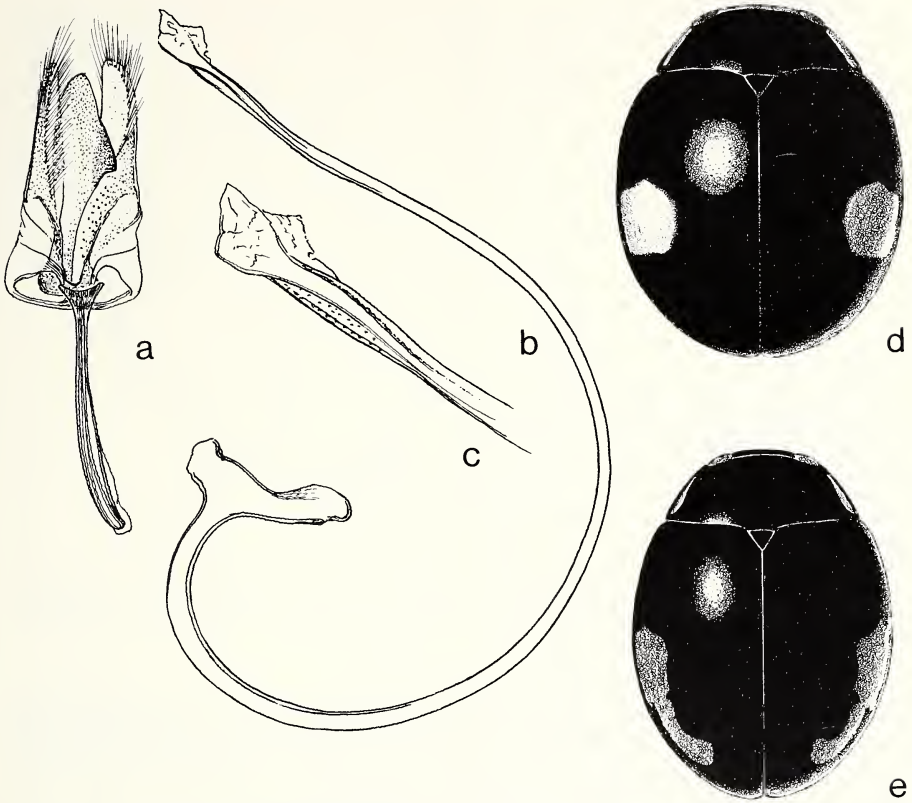


Fig. 383. *Hyperaspis osculans*.

Hyperaspis osculans LeConte

Fig. 383a-e; Map, Fig. 384

Hyperaspis osculans LeConte, 1880, p. 187.—Casey, 1899, p. 125.—Leng, 1920, p. 211.—Korschevsky, 1931, p. 193.—Dobzhansky, 1941, p. 49.

Hyperaspis biornatus Nunenmacher, 1934a, p. 18. **New Synonymy.**

Hyperaspis biornata biornata: Dobzhansky, 1941, p. 52.

Diagnosis. Length 2.50 to 3.10 mm, width 2.0 to 2.40 mm. Form broadly rounded, somewhat convex. Pronotum of female black except anterolateral angle reddish brown or with narrow yellow margin. Elytron with single red or yellow marginal spot, spot often extended to apex (Fig. 383d, e). Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved, area within line densely punctured. Male genitalia as in Figure 383a-c.

Discussion. This species and *H. pleuralis* have similar color patterns and can be confused unless genitalia or antennae are examined. *Hyperaspis osculans* is larger

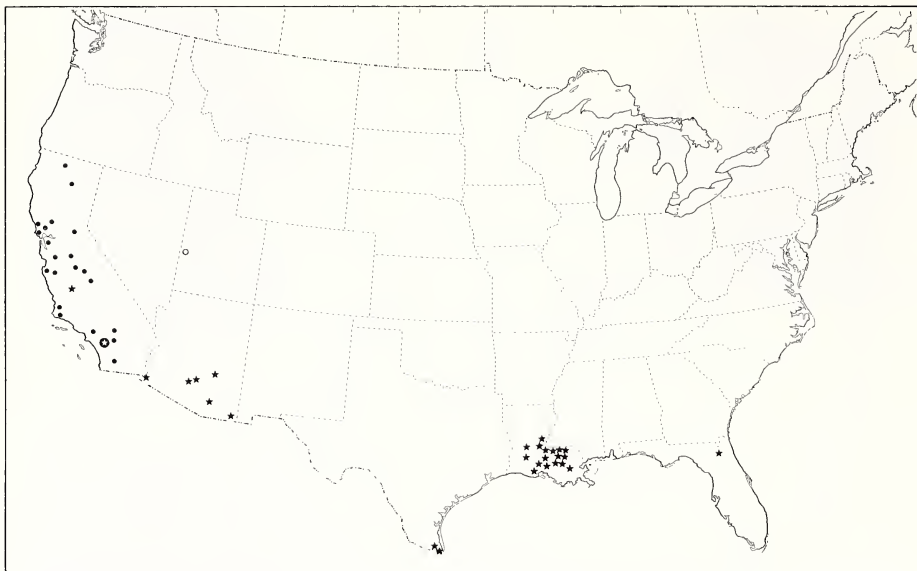


Fig. 384. Distribution. *Hyperaspis osculans* (dot); *H. uteana* (open circle); *H. mckenziei* (circled star); *H. connectens* (star).

and usually has a larger spot on the elytron. *Hyperaspis biornata* Nunenmacher has the spot on the elytron extended posteriorly as in Figure 383e. I have seen several examples of *H. osculans* that have traces of this posterior extension and are intermediate in this respect between typical *H. osculans* and *H. biornata*. The male genitalia of these forms are not separable and I consider *biornata* a junior synonym of *osculans*. The unique holotype male of *biornata* is labeled "Livermore Hills. VI-33/Alameda Co. Cal/male sign / *Hyperaspis biornatus* Nun." LeConte had more than one type specimen of *osculans*, therefore I here designate and label a female in his collection labeled "Cala./Type 0712(red paper)/*H. osculans* Lec." as the lectotype. Two other specimens are present with the lectotype, but I do not know whether they were part of the original series or not.

Type locality. Of *osculans*; California (lectotype here designated); of *biornata*, Livermore Hills, Alameda Co., California.

Type depository. Of *osculans*, MCZ; of *biornata*, MCZ.

Distribution. Figure 384. CALIFORNIA: Alameda Co., Niles Canyon; Bass Lake; Contra Costa Co., Mt. Diablo; Eldorado Co.; Ft. Tejon; Fresno Co., Stevenson Creek; Glenn Co., Black Butte; Kaweah; Lebec; Los Angeles Co., Tanbark Flat; Marin Co.; Monterey Co.; Napa Co., Pope Valley; Riverside; San Benito Co., Panoche Pass; Big Bear Lake; San Bernardino Mts.; Pinon Flat; San Jacinto Mts.; Santa Barbara; San Luis Obispo Co., La Panza; Sequoia Nat. Park; Shasta Co., Cayton; Siskiyou Co.; Sonoma Co., Eldridge.

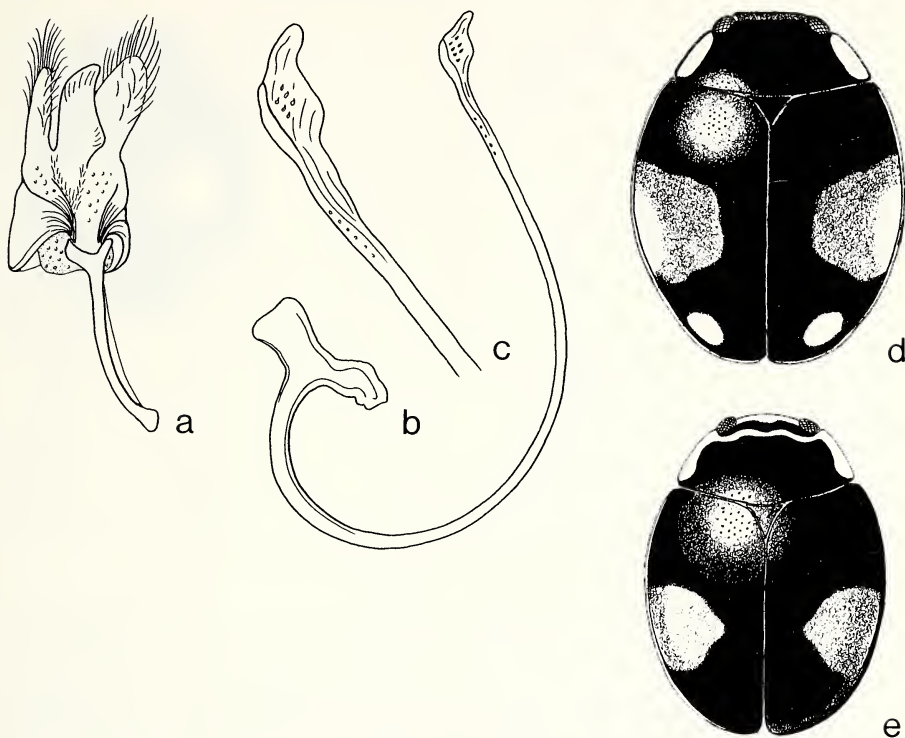


Fig. 385. *H. uteana*.

***Hyperaspis uteana*, new species**

Fig. 385a–c; Map, Fig. 384

Description. Male, length 2.40 mm, width 1.85 mm. Form oval, convex. Pronotum with irregular yellow area on lateral margin, apical margin with narrow, transverse, yellow vitta not touching apical margin, not joining lateral yellow area. Elytron black with large, orange, median spot on lateral margin extending onto disc, orange spot with small, yellow area near lateral border (Fig. 385d). Punctures on head fine, separated by a diameter; pronotal punctures coarser than on head, separated by a diameter; punctures on elytron equal in size to pronotal punctures, separated by one or 2 times a diameter. Metasternum with coarse punctures laterally, becoming finer medially. Abdomen with basal 2 sterna coarsely punctured, punctures separated by less than to 3 times a diameter; apical 4 sterna with punctures moderate in size, dense, nearly contiguous. Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved throughout, area within line polished, sparsely punctured. Genitalia as in Figure 385a–c.

Female, similar to male except head black; length 2.60 mm, width 2.0 mm; pronotum without anterior yellow vitta, elytron as in male except with apical yellow spot (Fig. 385e).

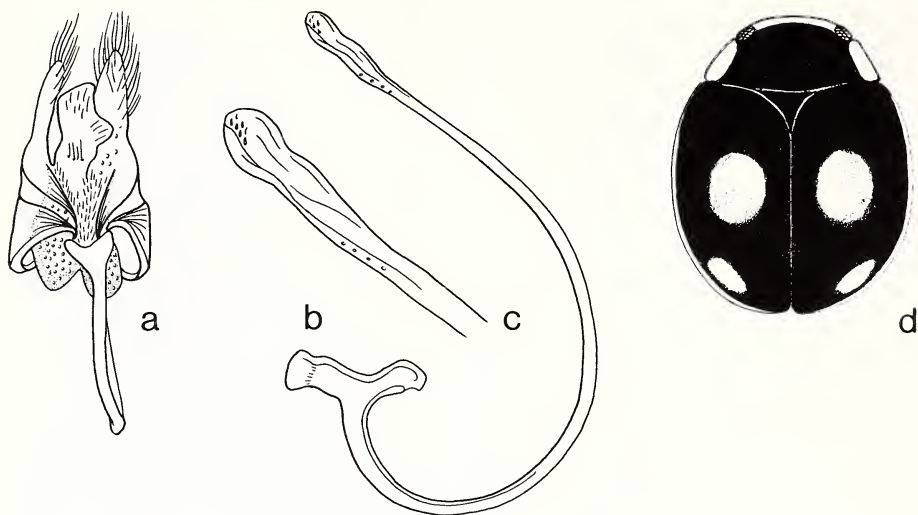


Fig. 386. *Hyperaspis mckenziei*.

Holotype. Male. UTAH: White Valley, Millard Co., Date 7-22-40. Collection R. W. Fautin (USNM 101339).

Allotype. Female. UTAH: same data as holotype except date "8-13-40." USNM.

The presence of a yellow spot within the orange spot on the elytron, if consistent, will separate *H. uteana* from any other described species of North American *Hyperaspis*. The male genitalia are most similar to those of *H. mckenziei*. The specific epithet refers to the state in which the type series was collected.

Hyperaspis mckenziei Nutting

Fig. 386a-d; Map, Fig. 384

Hyperaspis mckenziei Nutting, 1980, p. 264.

Diagnosis. Length 2.20 mm, width 1.75 mm. Form rounded; convex. Pronotum of male broadly yellow laterally; pronotum of female narrowly yellow. Elytron with large discal spot and small apical spot (Fig. 386d). Postcoxal line nearly reaching hind margin of first abdominal sternum, evenly curved throughout, area within line polished, coarsely punctured. Male genitalia as in Figure 386a-c.

Discussion. The convex, rounded form and elytral color pattern are unlike any other species of *Hyperaspis* from southern California. The limited type series were the only specimens seen, and this is unusual considering that California has been relatively well surveyed for Coccinellidae. The type specimens were collected in 1934, and it is possible that habitat destruction has eliminated *H. mckenziei* entirely.

Type locality. Palm Springs, Riverside Co., California.

Type depository. CAS.

Distribution. Figure 384. CALIFORNIA: Riverside Co., Palm Springs.

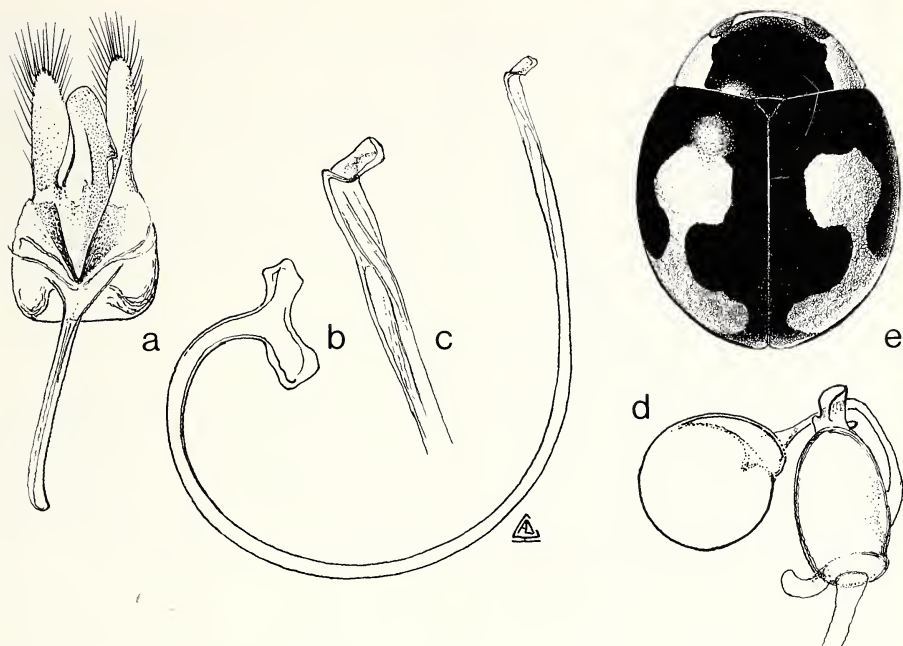


Fig. 387. *Hyperaspis connectens*.

connectens group

Members of this group possess the type of male and female genitalia characteristic of members of the *bigeminata* group, but have 10-segmented antennae. I consider the reduced number of antennal segments to be an independent reduction in this instance, without phyletic significance.

Both *H. rotunda* and *H. dobzhanskyi* are convex species with deeply excavated epipleurae; *H. connectens* is not convex and without deeply excavated epipleurae. It is possible that 2 groups should be established here, but at least for the present I prefer to use one group because all 3 species are quite similar in all other respects.

Hyperaspis connectens (Thunberg)

Fig. 387a-e; Map, Fig. 384

Coccinella connectens Thunberg, 1808, p. 157.

Hyperaspis connectens: Mulsant, 1850, p. 662.—Weise, 1904, p. 361.—Korschevsky, 1931, p. 186.—Dobzhansky, 1941, p. 25.—J. Chapin, 1974, p. 41.

Hyperaspis lengi Schaeffer, 1905, p. 144.—1908, p. 126.—Dobzhansky, 1941, p. 25.

Diagnosis. Length 2.50 to 3.0 mm, width 2.0 to 2.30 mm. Form oval, not strongly convex. Pronotum of male and female black with broad lateral yellow area. Elytron with 2 yellow spots usually connected (Fig. 387e), but sometimes discrete. Postcoxal

line not reaching hind margin of first abdominal sternum, slightly flattened along margin, area within line coarsely, sparsely punctured. Male genitalia as in Figure 387a-c. Female genitalia as in Figure 387d.

Discussion. The normal color pattern of this species is distinctive, causing it to be readily recognized. The range of *H. connectens* is broad, extending through Mexico to Nicaragua and to several islands in the Caribbean in addition to the United States localities. I have seen a male and a female type of *H. lengi* Schaeffer and here designate and label the male labeled "Type/Esperanza Rch, Brownsville, Tex, VIII-25/ Cotype No. 42551 U.S.N.M. (red paper)/ *Hyperaspis lengii* Schaeffer type" as the lectotype, and the female as a paralectotype.

Type locality. Of *connectens*, "Habitat in insula St. Eustachii"; of *lengi*, Brownsville, Texas (lectotype here designated).

Type depository. Of *connectens*, not located; of *lengi*, USNM (42551).

Distribution. Figure 384. ARIZONA: Cochise Co., Palmerly; Globe; Mesa; Phoenix; Tucson; Yuma. CALIFORNIA: Kings Co., Hanford. FLORIDA: Gainesville. LOUISIANA: (Parishes) Ascension, Avoyelles, Catahoula, East Baton Rouge, East Feliciana, Evangeline, Iberville, Lafayette, Livingston, Pointe Coupee, Rapides, St. Helena, St. James, St. John, St. Landry, St. Martin, Vermilion, West Baton Rouge, West Feliciana. TEXAS: Brownsville; Edinburg; Harlingen; San Benito.

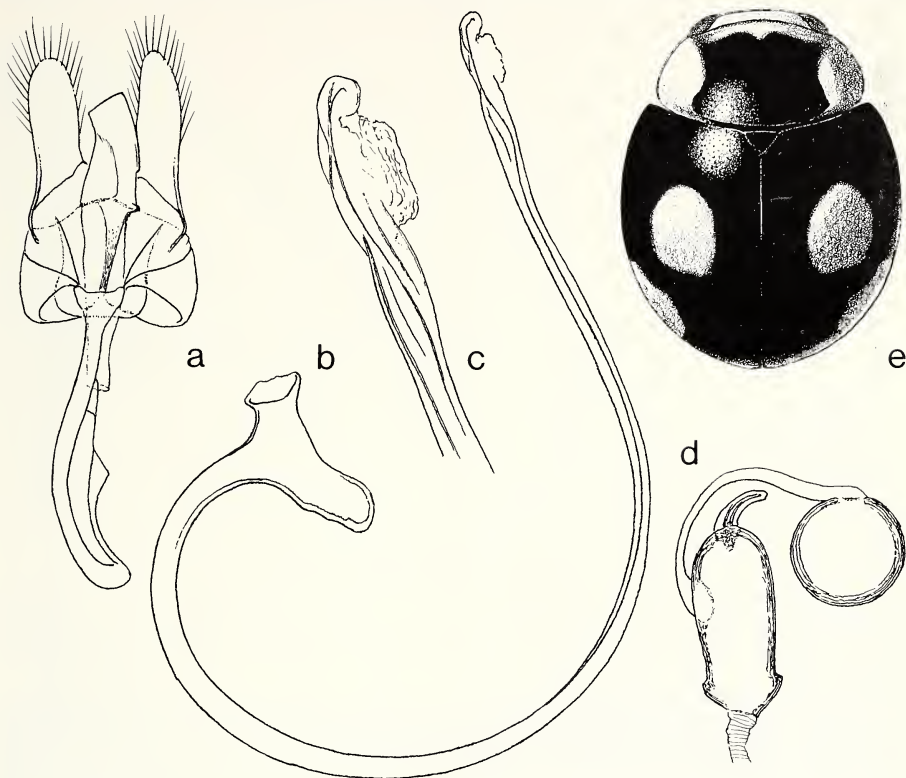


Fig. 388. *Hyperaspis rotunda*.

Hyperaspis rotunda Casey
Fig. 388a-e; Map, Fig. 389

Hyperaspis rotunda Casey, 1899, p. 123.—Dobzhansky, 1941, p. 26.

Hyperaspis rotundata: Korschefsky, 1931, p. 195 (error).

Diagnosis. Length 2.20 to 2.80 mm, width 1.80 to 2.0 mm. Form rounded, strongly convex. Pronotum of male and female black with broad lateral yellow area. Elytron with 2 yellow spots, apical spot transverse (Fig. 388e). Postcoxal line nearly reaching hind margin of first abdominal sternum, flattened along margin, area within line polished, finely, sparsely punctured. Male genitalia as in Figure 388a-c. Female genitalia as in Figure 388d.

Discussion. The almost globular form and elytral color pattern are fairly distinctive for this species. The type of *H. rotunda* in a unique male (holotype) in the Casey collection.

Type locality. Brownsville, Texas.

Type depository. USNM (35162).

Distribution. Figure 389. TEXAS: Brownsville; St. Thomas.

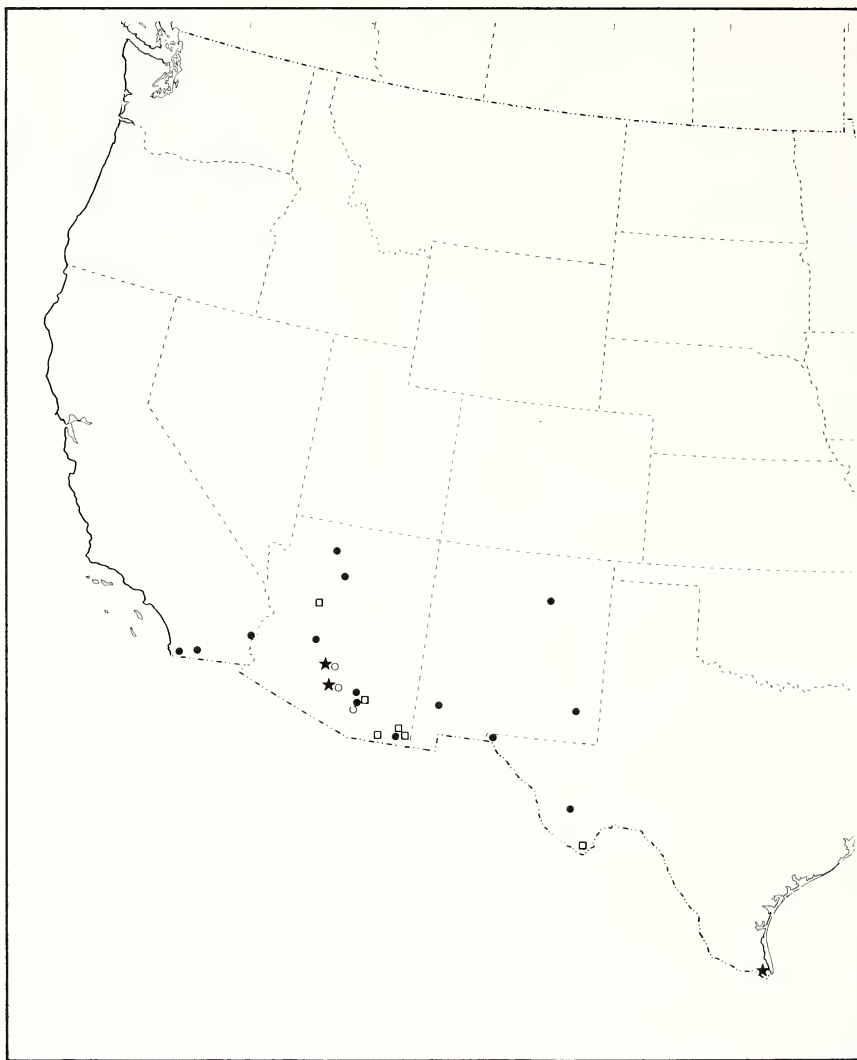


Fig. 389. Distribution. *Hyperaspis rotunda* (star); *H. dobzhanskyi* (open circle); *H. gemma* (dot); *H. conspirans* (square).

***Hyperaspis dobzhanskyi*, new species**

Fig. 390a-d; Map, Fig. 389

Description. Male, length 2.45 mm, width 1.90 mm. Form oval, not strongly convex. Dorsal color pattern as illustrated for *H. rotunda* except apical spot on elytron nearly reaching elytral suture (Fig. 390d). Punctures on head fine, separated by a

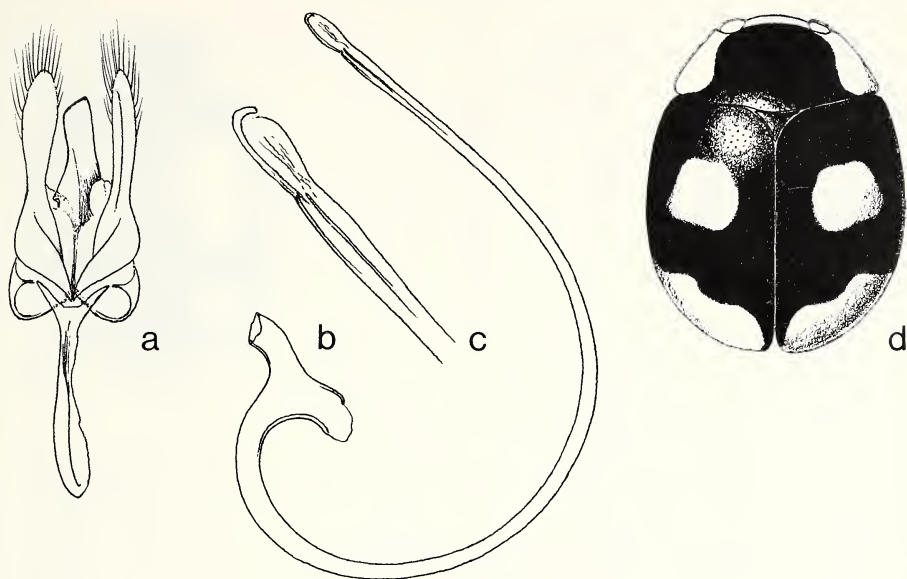


Fig. 390. *Hyperaspis dobzhanskyi*.

diameter; pronotal punctures coarser than on head, separated by one or 2 times a diameter; punctures on elytron feebly impressed, coarser than on pronotum laterally, becoming slightly finer medially. Abdominal sterna with fine, dense punctures except first sternum with coarse, sparse puncture. Postcoxal line not reaching hind margin of first abdominal sternum, flattened along margin, area within line coarsely punctured. Genitalia as in Figure 390a-c.

Female, similar to holotype except head black; length 2.55 mm, width 2.0 mm.

Holotype. Male. ARIZONA: Phoenix (USNM 101340).

Allotype. Female. ARIZONA: Sacaton. (USNM).

Paratype. Total 1 (Fig. 389). ARIZONA: Tucson. (USNM).

The type series of *H. dobzhanskyi* is composed of those Arizona specimens seen by Dobzhansky (1941) and included with the specimens of *H. rotunda* from Texas. Both the male genitalia and the body form of *H. dobzhanskyi* differ from those of *H. rotunda*. Therefore, I consider it another species and name it for T. Dobzhansky.

gemma group

Male genitalia with basal lobe of the *bigeminata* type, but paramere not spoon shaped, strongly narrowed in apical (Fig. 391a); pronotum with large yellow areas, elytron with 3 yellow spots, spots sometimes confluent.

The 3 species in this group are very closely related, making the *gemma* group one of the most closely knit units of North American *Hyperaspis*.

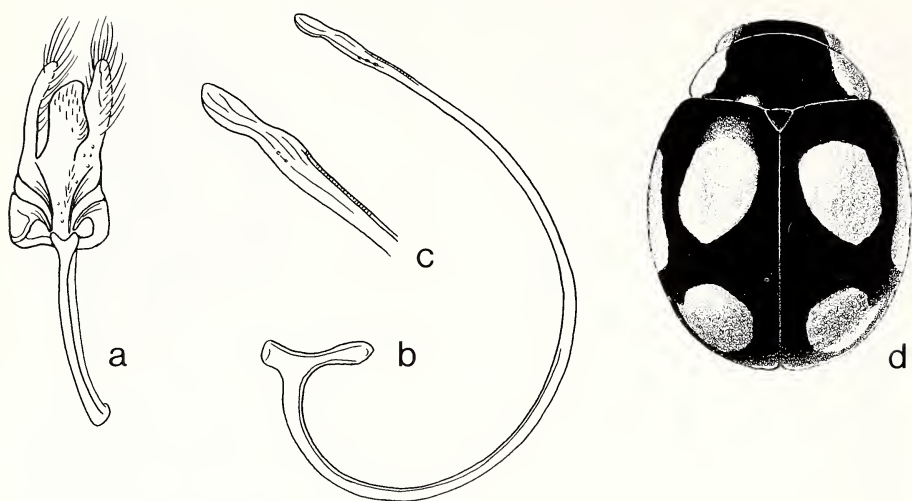


Fig. 391. *Hyperaspis gemma*.

Hyperaspis gemma Casey
Fig. 391a-d; Map, Fig. 389

Hyperaspis gemma Casey, 1899, p. 123.—1908, p. 414.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 189.—Dobzhansky, 1941, p. 13.

Diagnosis. Length 2.20 to 2.80 mm, width 1.80 to 2.20 mm. Form oval, convex. Male head with base of vertex black, female head entirely black. Pronotum of male yellow with basal black area not reaching anterior margin; pronotum of female black with large yellow area laterally. Elytron with 3 yellow spots, anterior margin of apical spot emarginate (Fig. 391d). Postcoxal line reaching hind margin of first abdominal sternum, flattened along margin, outer $\frac{1}{3}$ angulate, area within line smooth, sparsely punctured. Male genitalia as in Figure 391a-c.

Discussion. The type of this distinctive species is a unique male (holotype) in the Casey collection. All members of this group are similar in external appearance, but the seemingly minor differences in color patterns are constant and are reinforced by genitalic differences.

Type locality. El Paso, Texas.

Type depository. USNM (35155).

Distribution. Figure 389. ARIZONA: Bright Angel Camp; Chiricahua Mts.; Ft. Grant; Hot Springs; Huachuca Mts.; Montezuma Pass; Onion Saddle; Oracle; Pinal; Mt. Williams. CALIFORNIA: Riverside Co., Blythe; San Diego Co., Hemet Reservoir; San Jacinto Mts. NEW MEXICO: Las Vegas; Silver City. TEXAS: Alpine.

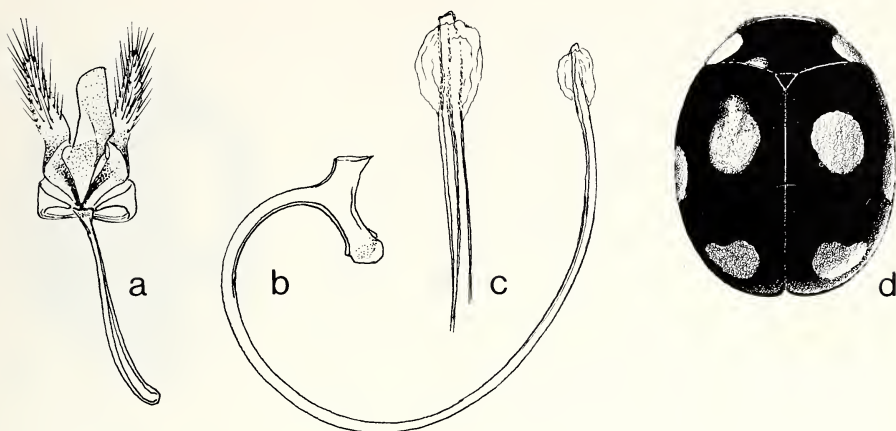


Fig. 392. *Hyperaspis conspirans*.

Hyperaspis conspirans Casey

Fig. 392a-d; Map, Fig. 389

Hyperaspis conspirans Casey, 1908, p. 414.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 186.—Dobzhansky, 1941, p. 12.

Diagnosis. Length 1.90 to 2.30 mm, width 1.50 to 1.80 mm. Form oval, convex. Male head with base of vertex black, female head entirely black. Pronotum of male black with broad lateral area yellow; pronotum of female similar to male except yellow area slightly reddened. Elytron with 3 yellow spots, anterior margin of apical spot usually emarginate (Fig. 392d). Postcoxal line as described for *H. gemma*. Male genitalia as in Figure 392a-c.

Discussion. This species is usually smaller than *H. gemma* and the male pronotum is mostly black; in *H. gemma* the male pronotum is mostly yellow. The type is a unique male (holotype) in the Casey collection.

Type locality. Nogales, Santa Cruz Co., Arizona.

Type depository. USNM (35161).

Distribution. Figure 389. ARIZONA: Chiricahua Mts.; Cochise Co., Palmerly; Huachuca Mts.; Montezuma Pass; Oracle; Prescott; Tucson. TEXAS: Brewster Co., Chisos Mts.

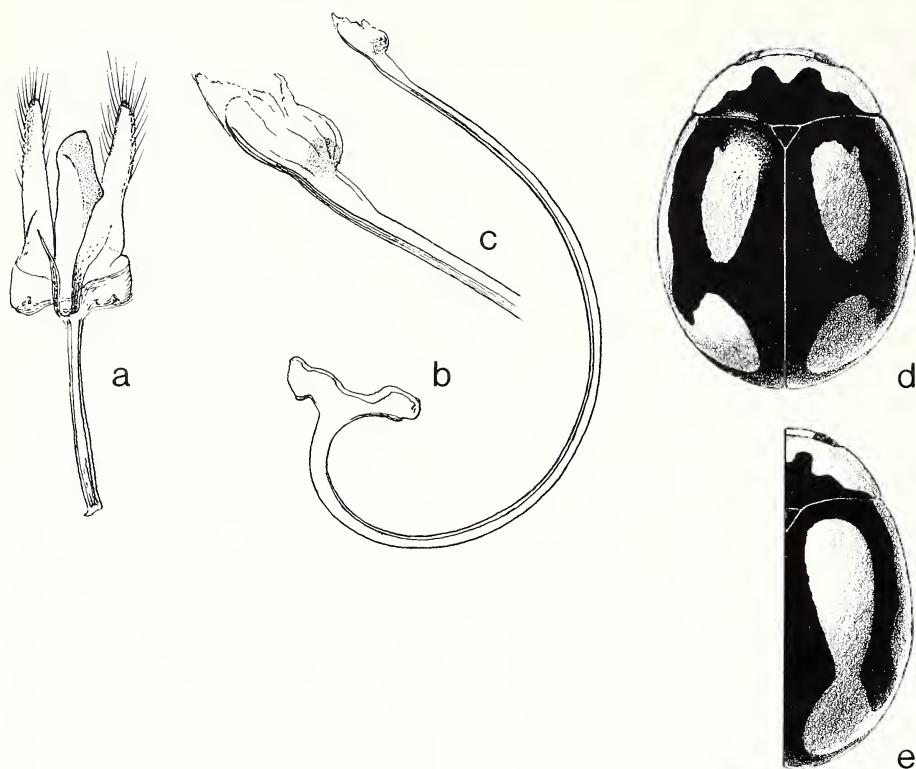


Fig. 393. *Hyperaspis fastidiosa*.

Hyperaspis fastidiosa Casey
Fig. 393a-c; Map, Fig. 394

Hyperaspis fastidiosa Casey, 1908, p. 414.—Korschevsky, 1931, p. 188.—Belicek, 1976, p. 312.

Hyperaspis fastidiosa fastidiosa: Dobzhansky, 1941, p. 14.

Hyperaspis fastidiosa septentrionis Dobzhansky, 1941, p. 15.

Diagnosis. Length 2.10 to 2.80 mm, width 1.50 to 1.90 mm. Form oval, not strongly convex. Male head with base of vertex black, female head entirely black or brown with yellow clypeus. Pronotum of male yellow with black quadri-lobed basal spot; spot often reduced to transverse band; pronotum of female black with large yellow area laterally. Elytron with 3 large yellow spots, marginal spot elongate from base to beyond middle (Fig. 393d). Postcoxal line as described for *H. gemma*. Male genitalia as in Figure 393a-c.

Discussion. The elongate marginal spot on the elytron along with the less convex form distinguish *H. fastidiosa* from the other members of this group. The color form described as *septentrionis* (Fig. 393e) by Dobzhansky is not geographically constant. It occurs in widely overlapping areas with typical *fastidiosa*, and often they are both

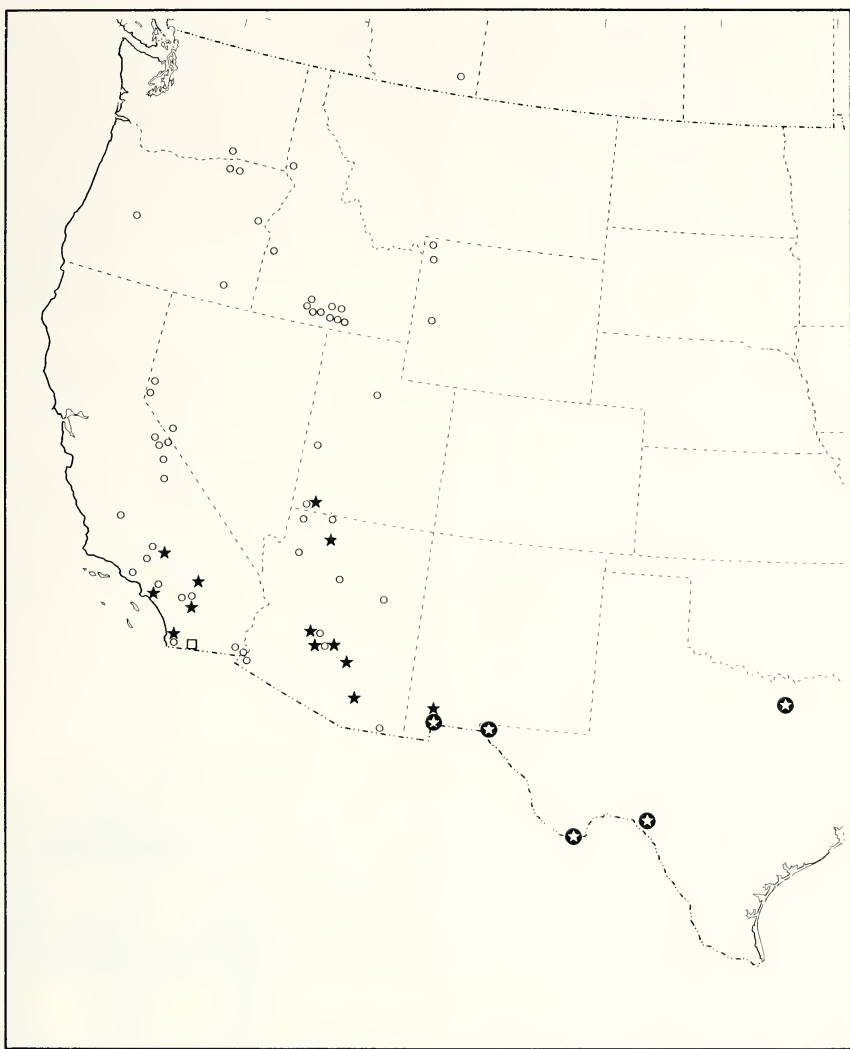


Fig. 394. Distribution. *Hyperaspis fastidiosa* (open circle); *H. longicoxitis* (square); *H. significans* (star); *H. cruenta* (circled star).

present in the same series, therefore I regard *septrionis* as a junior synonym of *fastidiosa*. The type of *H. fastidiosa* is a unique female (holotype) in the Casey collection.

Type locality. Of *fastidiosa*, San Diego Co., California; of *septrionis*, Murtaugh, Idaho.

Type depository. Of *fastidiosa* (35154) and *septrionis* (54201), USNM.

Distribution. Figure 394. ALBERTA: Medicine Hat. ARIZONA: Douglas; Flag-

staff; Ft. Yuma; Fredonia; Holbrook; Hot Springs; Kaibab; Peach Springs; Phoenix. CALIFORNIA: Ft. Tejon; Imperial Co., Ft. Yuma; Potholes; Inyo Co., Big Pine; Bishop; Independence; Westgard Pass; Kern Co.; Kings Co.; Los Angeles Co., Soledad; Olancho; Palm Springs; Ventura Co., Santa Paula. IDAHO: Amsterdam; Bliss; Buhl; Burley; Cassia Co., SE Malta; Castleford; Declo; Gooding; Hazelton; Moscow; Nampa; Paul. NEVADA: Carson City; Esmeralda Co.; Reno. OREGON: Durkee; Harney Co., Tencent Lake; Hermiston; Redmond; Umatilla. UTAH: American Fork; Delta; St. George. WASHINGTON: Benton Co., Hanford Works. WYOMING: Sublette Co., Pinedale; Grand Teton Park; Yellowstone Park.

longicoxitis group

Pronotal color pattern yellow with dark brown macula medially; elytron with 5 spots; female coxal plate elongate, triangular (Fig. 395d); male genitalia with paramere of *bigeminata* type.

Hyperaspis longicoxitis is the only member of this group known to occur, or have occurred, in North America. The species is native to the West Indies, and specimens have been seen from Trinidad and Dominica. The occurrence of *H. longicoxitis* in southern California is probably the result of an unrecorded biocontrol release, and whether or not the species is presently established is open to question since no specimens have been seen since 1955.

Hyperaspis longicoxitis Nutting

Fig. 395a-e; Map, Fig. 394

Hyperaspis longicoxitis Nutting, 1980, p. 260.

Diagnosis. Length 2.60 to 3.0 mm, width 2.20 to 2.40 mm. Form oval, somewhat rounded. Pronotum yellow with dark brown pattern medially. Elytron yellowish brown with 5 yellow spots (Fig. 395e). Postcoxal line reaching hind margin of first abdominal sternum, flattened along margin, area within line polished, nearly impunctate. Male genitalia as in Figure 395a-c. Female genitalia as in Figure 395d.

Discussion. This species has a pronotal color pattern and female coxal plates unique in the North American fauna. If it is established in the United States, specimens can be easily recognized.

Type locality. Jacumba, San Diego Co., California.

Type depository. CAS.

Distribution. Figure 394. Type locality.

Section II

Hyperaspis species with 10-segmented antenna; body shape elongate, or oval, usually not strongly convex; epipleuron of elytron narrow, without median groove, excavation for femoral apex shallow or extremely shallow; base of abdominal sternum within postcoxal arc flat, not depressed, without transverse fold or suture. As stated in the discussion of Section I, 3 species with 10-segmented antennae are not included in Section II because they are obviously allied to the *bigeminata* group of Section I.

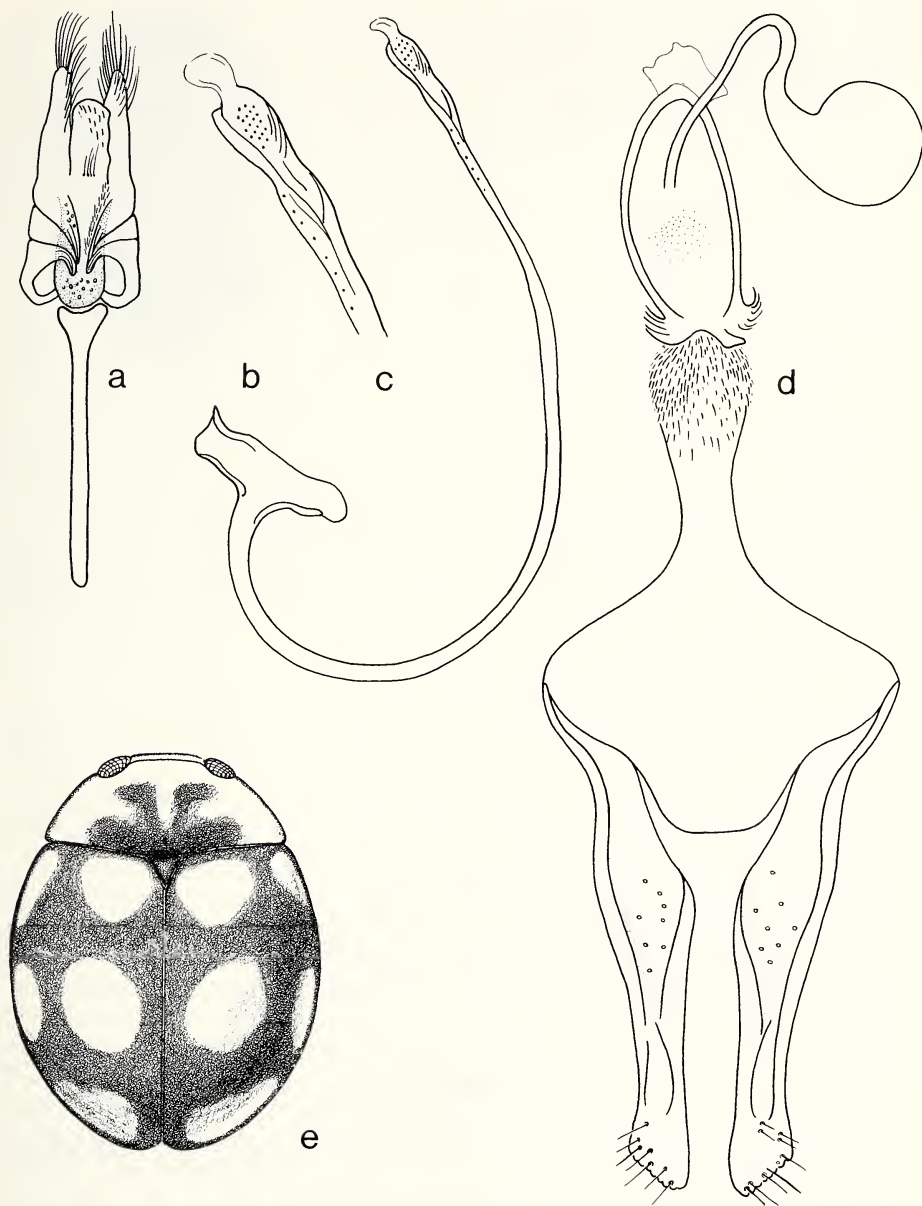


Fig. 395. *Hyperaspis longicoxitis*.

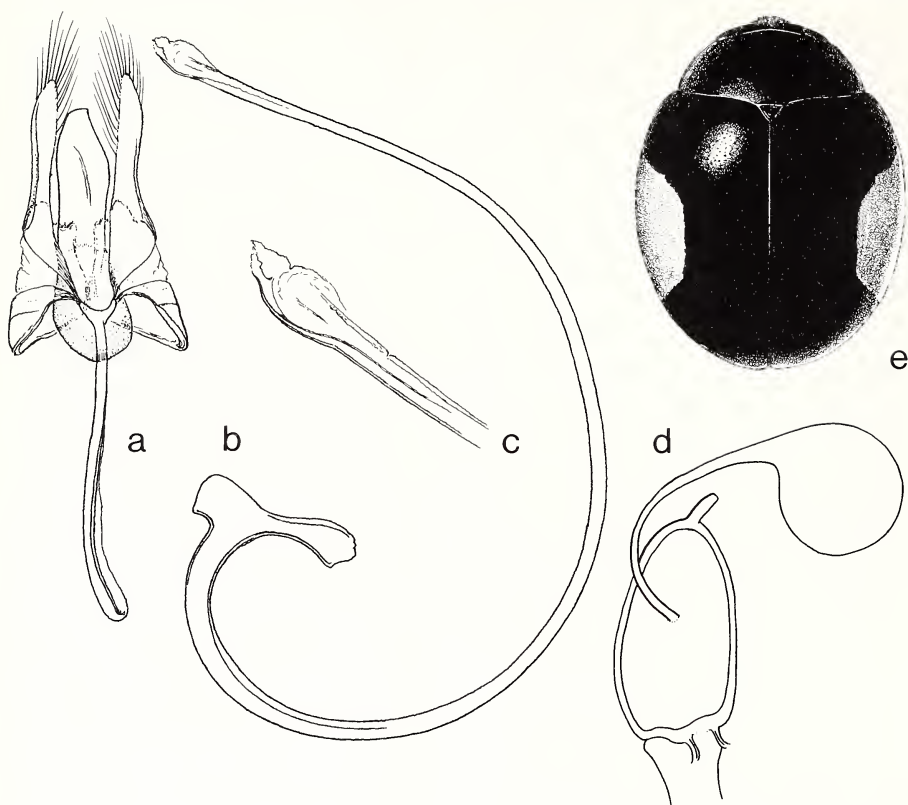


Fig. 396. *Hyperaspis significans*.

significans group

Female pronotum narrowly yellow laterally or entirely black except anterolateral angle obscurely paler; head of male usually red instead of yellow; head pubescent in both sexes; male genitalia with paramere slender, basal lobe with small lateral projection.

Hyperaspis significans Casey

Fig. 396a-e; Map, Fig. 394

Hyperaspis significans Casey, 1908, p. 416.—Leng, 1920, p. 211.—Korschevsky, 1931, p. 197.

Hyperaspis taeniata significans: Dobzhansky, 1941, p. 45.

Hyperaspis concurrens Casey, 1908, p. 416.—Leng, 1920, p. 211.—Korschevsky, 1931, p. 186. **New Synonymy.**

Hyperaspis taeniata var. *concurrents*: Dobzhansky, 1941, p. 46.

Diagnosis. Length 2.20 to 2.65 mm, width 1.70 to 2.10 mm. Form oval. Male

pronotum narrowly yellow laterally; female pronotum narrowly yellow or entirely black except anterolateral angle obscurely pale. Elytron entirely black or with single spot of varying size on lateral margin (Fig. 396e). Postcoxal line nearly reaching hind margin of first abdominal sternum, evenly curved throughout, area within line alutaceous, coarsely, densely punctured. Male genitalia as in Figure 396a–c. Female genitalia as in Figure 396d.

Discussion. The form of this species with maculate elytra (*significans*) and the form with immaculate elytra (*concurrans*) often occur together without intergrades. When this happens there are no genitalic differences, therefore I regard them as synonymous and the name *concurrans* cannot be maintained in even subspecific status. There are 4 types of *significans* in the Casey collection and I here designate and label a male as the lectotype, the remainder as paralectotypes. There are 3 types of *concurrans* in the Casey collection and I here designate and label a male as the lectotype, the remainder as paralectotypes.

Type locality. Of *significans* and *concurrans*, St. George, Utah (lectotypes here designated).

Type depository. Of *significans* (35181) and *concurrans* (35182), USNM.

Distribution. Figure 394. ARIZONA: Bright Angel; Pinal Co., Florence; Hot Springs; Maricopa Co., Sunflower; Phoenix; Tucson. CALIFORNIA: Claremont; Coachella Valley; Covina; Los Angeles Co.; Mojave; San Bernardino; San Diego Co. NEW MEXICO: Mesilla Park. UTAH: St. George.

Hyperaspis cruenta LeConte
Fig. 397a–d; Map, Fig. 394

Hyperaspis cruenta LeConte, 1880, p. 187.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 187.

Hyperaspis cruentata: Casey, 1899, p. 128. (error).

Hyperaspis taeniata rufescens Dobzhansky, 1941, p. 47. **New Synonymy.**

Diagnosis. Length 2.50 to 2.65 mm, width 2.0 to 2.10 mm. Form oval. Pronotum of male narrowly reddish yellow laterally; pronotum of female obscurely reddish brown laterally. Elytron with single marginal spot of varying size (Fig. 397d). Postcoxal line as described for *H. significans*. Male genitalia as in Figure 397a–c.

Discussion. This species was mistakenly redescribed as *H. taeniata rufescens* by Dobzhansky (1941). The subspecies Dobzhansky called *H. taeniata cruenta* is a species that I rename elsewhere. *Hyperaspis significans* and *H. cruenta* are very similar in external appearance, but the male genitalia of the 2 species are sufficiently different so that I cannot justify synonymizing *H. significans*. There are 2 types in the LeConte collection, one of which, labeled “Dallas, Texas/Type 6709(red paper)/*H. cruenta* Lec.”, I here designate and label as the lectotype, the other specimens as paralectotypes.

Type locality. Of *cruenta*, Dallas, Texas (lectotype here designated); of *rufescens*, El Paso, Texas.

Type depository. Of *cruenta*, MCZ; of *rufescens*, USNM (54209).

Distribution. Figure 394. NEW MEXICO: Mesilla Park. TEXAS: Devil’s River; Brewster Co., Rio Grande.

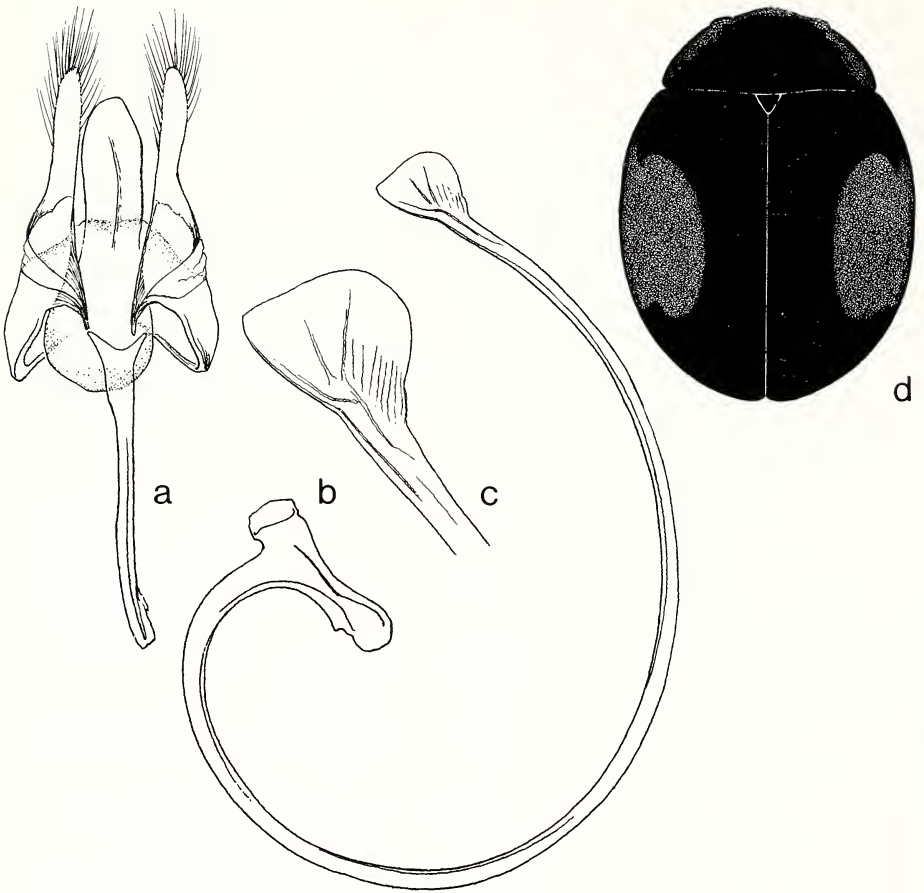


Fig. 397. *Hyperaspis cruenta*.

fimbriolata group

Female pronotum entirely black; body form oval, sometimes convex; color pattern of elytron composed of either a complete marginal vitta, or spots derived from a reduction of the vitta (except immaculate form of *pleuralis*); basal lobe of male genitalia with lateral projection in anterior, or median.

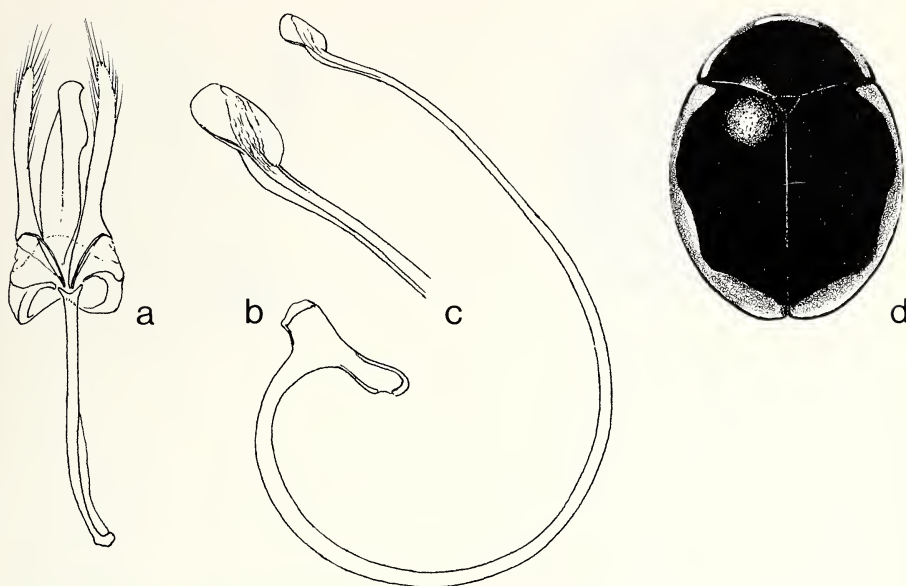


Fig. 398. *Hyperaspis sanctaeritae*.

Hyperaspis sanctaeritae Dobzhansky

Fig. 398a-d; Map, Fig. 399

Hyperaspis sanctaeritae Dobzhansky, 1941, p. 60.

Diagnosis. Length 2.0 to 2.30 mm, width 1.40 to 1.50 mm. Form oval, somewhat convex. Pronotum of male narrowly yellow laterally; female unknown. Elytron black with strong, complete lateral vitta (Fig. 398d). Postcoxal line reaching hind margin of first abdominal sternum, evenly curved, area within line smooth, sparsely, finely punctured. Male genitalia as in Figure 398a-c.

Discussion. This species is inseparable from the other species in this group having the same color pattern except by comparison of male genitalia. I have seen other specimens from the type locality of *H. sanctaeritae*, but none of these have been this species; the type series are the only specimens examined except for a single specimen from Nogales, Arizona.

Type locality. Santa Rita Mountains, Arizona.

Type depository. USNM (54213).

Distribution. Figure 399. ARIZONA: Nogales; Santa Rita Mts.

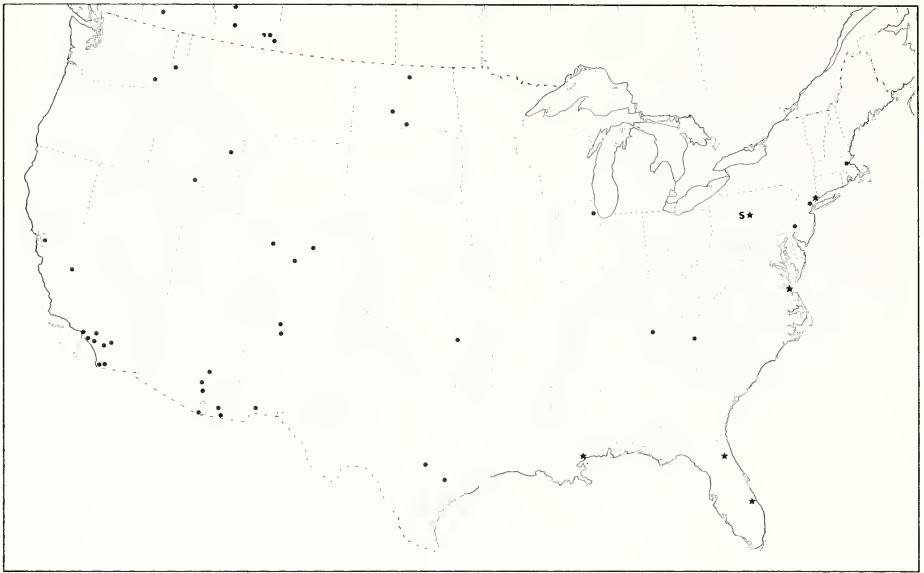


Fig. 399. Distribution. *Hyperaspis sanctaeritae* (open circle); *H. fimbriolata* (star); *H. inflexa* (dot).

Hyperaspis fimbriolata Melsheimer

Fig. 400a, b; Map, Fig. 399

Hyperaspis fimbriolata Melsheimer, 1847, p. 180.

Hyperaspis rufomarginata Mulsant, 1850, p. 661.—Gordon, 1974c, p. 210. **New**

Synonymy.

Hyperaspis fimbriolata atlantica Dobzhansky, 1941, p. 55. **New Synonymy.**

Diagnosis. Length 2.35 to 2.60 mm, width 1.80 to 2.0 mm. Form oval, somewhat convex. Pronotum of male with complete yellow area laterally; surface strongly alutaceous, impunctate. Elytron black with narrow, complete vitta (Fig. 400b); surface distinctly alutaceous, strongly punctured. Postcoxal line not reaching hind margin of first abdominal sternum, angulate, flattened along hind margin of sternum, area within line alutaceous, impunctate. Male genitalia as in Figure 400a.

Discussion. This species has long been misidentified by coccinellid workers (see discussion under *H. inflexa*), but an examination of the types has resulted in the correct application of the name *H. fimbriolata*. Part of the problem has been the

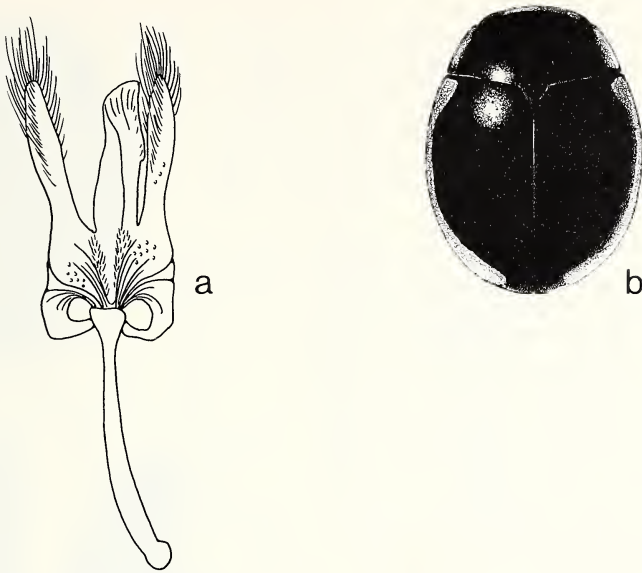


Fig. 400. *Hyperaspis fimbriolata*.

scarcity of specimens of the true *H. fimbriolata* in collections, and it now appears that this species is restricted to more or less coastal areas from Pennsylvania to Florida and Mississippi. The male genitalia are distinctive and, in addition, the heavily alutaceous, impunctate pronotum distinguishes this species from other species having the same color pattern. I designate and label a male in the MCZ collection labeled "Melsh, fimbriolata"/"red paper"/"fimbriolata" as the lectotype, and a female labeled "a" as a paralectotype. The subspecies *atlantica* Dobzhansky is identical to the type in all respects and cannot be maintained as a valid subspecies for any reason.

Type locality. Of *fimbriolata*, Pennsylvania (lectotype here designated); of *rufomarginata*, "l'Amerique boreale" (lectotype designated by Gordon, 1974c); of *atlantica*, Capron, Florida.

Type depository. Of *fimbriolata*, MCZ; of *rufomarginata*, DLM; of *atlantica*, USNM.

Distribution. Figure 399. FLORIDA: Crescent City; Capron. MISSISSIPPI: Waveland. NEW YORK: White Plains. VIRGINIA: Ft. Monroe.

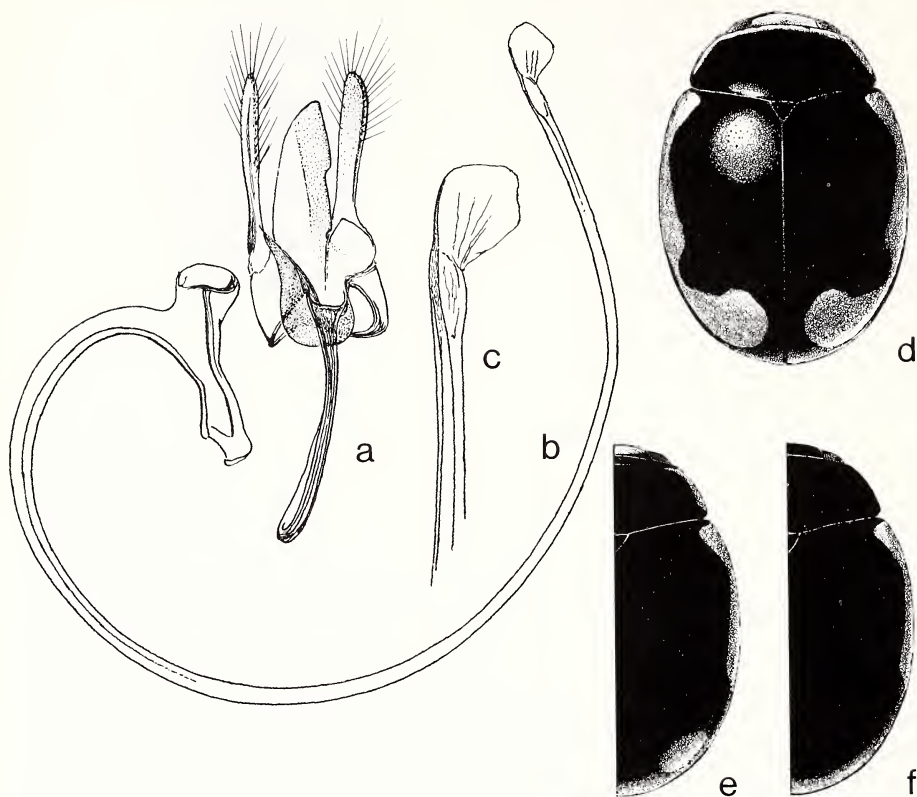


Fig. 401. *Hyperaspis inflexa*.

Hyperaspis inflexa Casey

Fig. 401a-f; Map, Fig. 399

Hyperaspis inflexa Casey, 1899, p. 126.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 190.

Hyperaspis fimbriolata inflexa: Dobzhansky, 1941, p. 56.

Hyperaspis serena Casey, 1908, p. 417.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 195.

Hyperaspis fimbriolata serena: Dobzhansky, 1941, p. 55.

Hyperaspis fimbriolata (of authors, not Melsheimer, 1847): LeConte, 1852, p. 134.—Crotch, 1873, p. 379 (in part).—Casey, 1899, p. 126 (in part).—Leng, 1920, p. 211.—Korschefsky, 1931, p. 188 (in part).—Wingo, 1952, p. 26.—Belicek, 1976, p. 313 (in part).

Hyperaspis fimbriolata fimbriolata: Dobzhansky, 1941, p. 54 (not *fimbriolata* Melsheimer, 1847).

Diagnosis. Length 1.80 to 2.85 mm, width 1.40 to 2.10 mm. Form oval, somewhat convex. Male pronotum with narrow lateral area and often narrow anterior border yellow. Color pattern of elytron variable, basic pattern black with broad, complete, lateral vitta, vitta varying in width and shape, often broken to form isolated apical spot, or extending only from humeral angle to midpoint (Fig. 401d–f). Postcoxal line nearly reaching hind margin of first abdominal sternum, flattened along hind margin of sternum, area within line feebly alutaceous, distinctly punctured. Male genitalia as in Figure 401a–c.

Discussion. Because of the variable color pattern of the elytron, wide distribution, and the close morphological similarity in other respects of *H. inflexa* to *H. sanctaeritae* and *H. caseyi*, n. sp., it is imperative that male genitalia be examined in order to identify the species. The basal lobe of the male genitalia of *H. inflexa* consistently has the lateral projection blunt and in the apical half. The name *fimbriolata* Melsheimer has been invariably applied to this species by authors since Melsheimer's original description (see discussion under *H. fimbriolata*). That name refers to another species, therefore I use the next available name, *H. inflexa*, which Casey used to describe a form of what was then considered to be *H. fimbriolata*. The male genitalia do not vary significantly, and the different color patterns of *H. inflexa* do not occur in a pattern that permits the use of discrete subspecies, therefore, I do not follow the classification proposed by Dobzhansky (1941) where this species is concerned. There are 2 types of *inflexa*, both females, in the Casey collection, one of which I designate and label as the lectotype, the other as a paralectotype. The unique type (holotype) of *serena* is also a female.

Type locality. Of *inflexa*, Bismarck, North Dakota (lectotype here designated); of *serena*, Pennsylvania.

Type depository. Of *inflexa* (35192) and *serena* (35193), USNM.

Distribution. Figure 399. ALBERTA: Bassano Dam; Cypress Hills; Edmonton; Jenner; Medicine Hat. BRITISH COLUMBIA: Vernon. ARIZONA: Douglas; Globe; Pinal Mts.; Santa Catalina Mts.; St. Cruz Co., Nogales; Tombstone. CALIFORNIA: Anaheim; Azusa; Berkeley; Coronado; Fresno Co., Salma; Long Beach; Riverside; San Diego; Santa Monica. COLORADO: Glenwood Springs; Golden; Salida Co. IDAHO: Cassia Co., Malta; Hayden's Lake; Jefferson Co., Terreton. ILLINOIS: Willow Springs. MASSACHUSETTS: Framingham. NEW JERSEY: Emerson. NEW MEXICO: Albuquerque; Deming; Jemez Mts. NORTH CAROLINA: Black Mt. NORTH DAKOTA: Grant Co., Lake Tschida; Mandan; McHenry Co. OKLAHOMA: Tulsa. PENNSYLVANIA: South Philadelphia. TENNESSEE: Cleveland. TEXAS: Austin; Flatonia. WASHINGTON: Palouse.

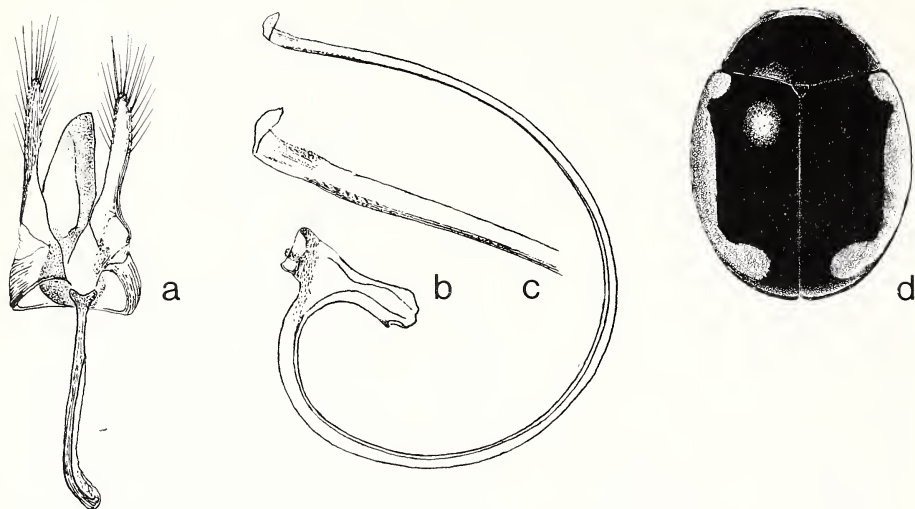


Fig. 402. *Hyperaspis cincta*.

Hyperaspis cincta LeConte

Fig. 402a-d; Map, Fig. 404

Hyperaspis cincta LeConte, 1858, p. 89.—Crotch, 1873, p. 379.—Crotch, 1874b, p. 231.—LeConte, 1880, p. 189.—Casey, 1899, p. 126.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 186.—Dobzhansky, 1941, p. 56.

Diagnosis. Length 2.0 to 2.60 mm, width 1.40 to 2.0 mm. Description as for *H. inflexa* except elytron with marginal vitta wider, as in Figure 402d. Male genitalia as in Figure 402a-c.

Discussion. The male genitalia of *H. cincta* do not differ from those of *H. inflexa* to any significant degree, no more than the variation to be found within a series of either species. I can find no external differences between these 2 species other than the width of the lateral vitta on the elytron. Both species may occur at some of the same localities without color intergrades, at least none that have been examined. If intergrades do occur with any degree of frequency, I would favor the establishment of either subspecies or a single valid species. I do not have this evidence, therefore I maintain 2 species names here, and express serious doubt as to whether this is an accurate reflection of the actual situation. The type of *H. cincta* is apparently not in the LeConte collection and could not be located elsewhere.

Type locality. Santa Isabel, California.

Type depository. Type not located.

Distribution. Figure 404. CALIFORNIA: Contra Costa Co., Antioch; Fresno Co., Coalinga, Mendota, Selma; Kern Co., Wasco; Los Banos; Los Angeles; Modesto; Riverside Co., Cabazon; San Diego Co., El Cajon, Mt. Laguna; Tulare Co., Visalia. UTAH: Salt Lake.

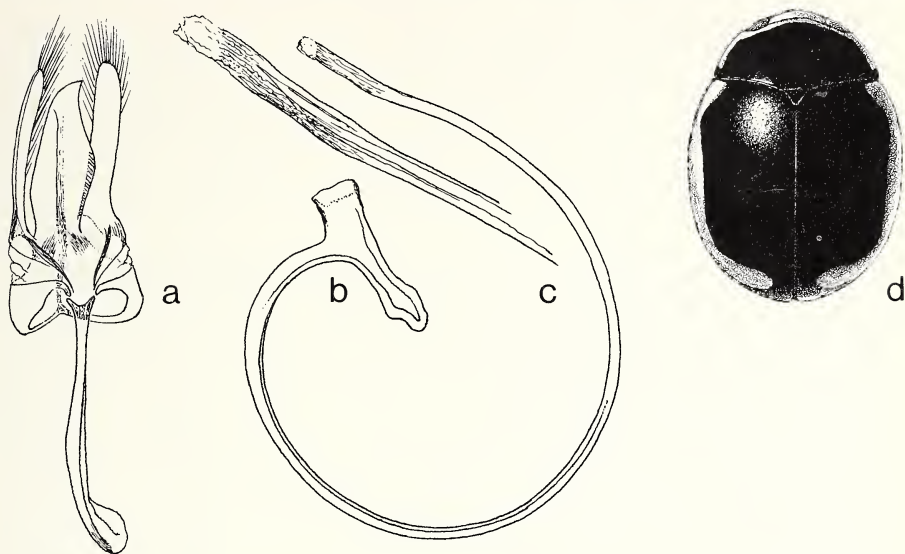


Fig. 403. *Hyperaspis caseyi*.

***Hyperaspis caseyi*, new species**

Fig. 403a-d; Map, Fig. 404

Description. Male, length 2.30 mm, width 1.85 mm. Form oval, somewhat convex. Pronotum narrowly yellow on apical and lateral border. Elytron black with complete, irregular, lateral vitta (Fig. 403d). Punctures on head fine, separated by a diameter; pronotal punctures coarser than on head, separated by a diameter or less; punctures on elytron equal in size to pronotal punctures, separated by one or two times a diameter. Metasternum with coarse punctures laterally, becoming slightly finer medially. Abdomen with basal 3 sterna coarsely punctured, punctures separated by less than to 3 times a diameter; apical 3 sterna finely, indistinctly punctured. Postcoxal line not reaching hind margin of first abdominal sternum, evenly rounded, area within line coarsely punctured. Genitalia as in Figure 403a-c.

Female, similar to male except head black; length 2.70 mm, width 2.0 mm.

Variation. Length 1.90 to 2.70 mm, width 1.50 to 2.0 mm. The width of the elytral vitta varies slightly, and a series from Palisade, Colorado, has the same dorsal color pattern as figured for *H. taeniata*.

Holotype. Male. TEXAS: Thurber, 25/8/05, R. C. Howell coll. (USNM 101341).

Allotype. Female. ARIZONA: Huachucha Mts. (USNM).

Paratypes. Total 65 (Fig. 404). ARIZONA: 2, state record, Morrison, coll. Hubbard & Schwarz. Chiric. Mts., 7.6, Collection Hubbard & Schwarz; Chiricahua Mts, VI-29-08; Chiricahua Mts, Alt. 6200, 20 June 1928, AA Nichol; Chiricahua Mts., 85-9700 ft., Aug. 5-1927, Flys Peak, Cochise Co., JA Kushe Collector; Chiricahua Mts., 13 June 1956, OL Cartwright. H. Mts. (Huachucha Mts.), VI-16. Sacaton, 6.14.09,

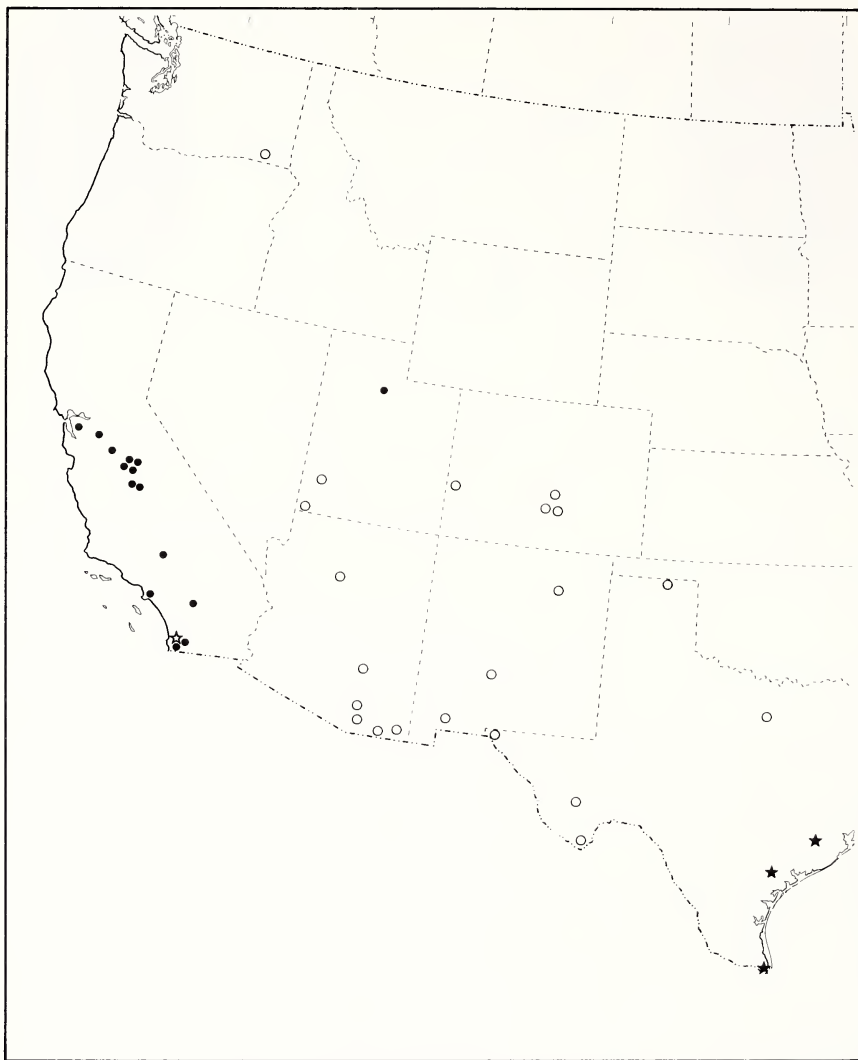


Fig. 404. Distribution. *Hyperaspis cincta* (dot); *H. caseyi* (open circle); *H. schaefferi* (star); *H. limbalis* (open star).

CN Ainslie Collector. S. Rita Mts., 6.6, Coll. Hubbard & Schwarz. Tucson, III-27, 1935, Bryant 47; Tucson, June 20, 1937, Bryant 47. Williams, 19.7, Barber & Schwarz. COLORADO: Colo., 2112, Wickham Collection. Colorado Springs, 4.4.91, Colo. Spgs., 11.10, Collection H. Soltau; Colorado Springs, June 15-30, '96, 6,000-7,000 ft, H. F. Wickham. Florence, 12.10, Collection H. Soltau. Palisade, IX027-'29, WA Shands. Pueblo; Pueblo, 7.10, Collection H. Soltau. NEW MEXICO: Deming, July

11-12, 4300-4400 ft, Wickham. Las Vegas, 12.8, Barber & Schwarz Coll. Magdalena, Strickler. TEXAS: Alpine, May 2, 1927, JO Martin Collector. Brewster Co., Chisos Mts., VI, 10-12-06. Chisos Mts., VIII'6, JW Green Collector; Chisos Mts., VII-21, JW Green Collector. El Paso, VI-7; 3, El Paso, IV.27.1927. JO Martin Collector; El Paso, July 8-9, 3700-3800 ft., Wickham. Perryton, VIII-14-37, R. E. Shaul. UTAH: Milford, July 7, Wickham. St. George, July, Wickham. WASHINGTON: Walla Walla, 4-1941, H. P. Lanchester. Touchet, 4-1-38, H. P. Lanchester. (CAS) (CDA) (USNM).

Except for the male genitalia, this species is not separable from *H. inflexa*, and has been called *H. fimbriolata* by all previous authors. Three specimens from Palisade, Colorado, have the *H. taeniata* color pattern, and I suspect that the typical *H. dissoluta* and *H. nevadica* pattern will also be found in *H. caseyi*. The male genitalia of *H. caseyi* are most similar to those of *H. schaefferi*, n. sp., from south Texas. The presence of complete elytral vittae in *H. caseyi*, and the incomplete vittae of *H. schaefferi* will separate these 2 species at present, but this character may prove to be inconstant. The Washington state examples of this species are clearly questionable, but I cannot associate them with any other species treated herein. *Hyperaspis caseyi* is named for Thomas Casey in recognition of his revision of the North American Coccinellidae (1899).

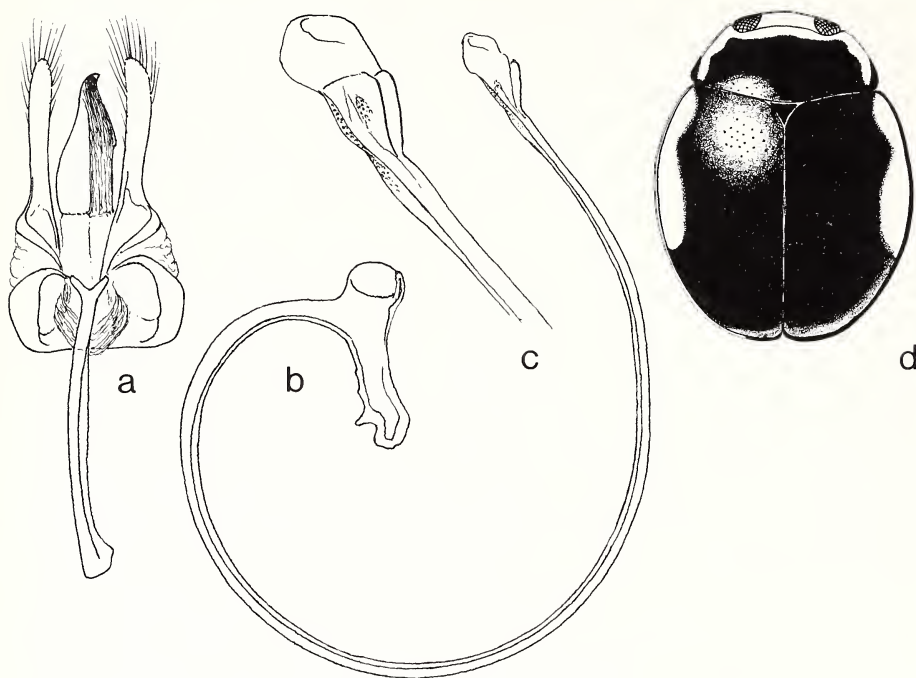


Fig. 405. *Hyperaspis schaefferi*.

***Hyperaspis schaefferi*, new species**

Fig. 405a-d; Map, Fig. 404

Hyperaspis taeniata cruenta Dobzhansky, 1941, p. 48 (not *cruenta* LeConte, 1880).

Description. Male, length 2.50 mm, width 2.0 mm. Form broadly oval, moderately convex. Description as for *H. caseyi* except lateral vitta on elytron incomplete (Fig. 405d); postcoxal line on first abdominal sternum reaching hind margin, flattened along hind margin. Genitalia as in Figure 405a-c.

Female, similar to holotype except head and pronotum black.

Variation. Length 2.20 to 2.75 mm, width 1.70 to 2.20 mm.

Holotype. Male. TEXAS: Esper Rich (Esperanza Ranch), Brownsville, Tex., VII.30 (USNM 101342).

Allotype. Female. Same data as holotype except date VII.28. (USNM).

Paratypes. Total 8 (fig. 404). TEXAS: Brownsville, Esperanza Ranch, VIII.13, VII.30, VII.28; Columbus, 1.9, 17.6, 14.6, Coll. Hubbard & Schwarz; Goliad, 18.4, EA Schwarz Collector. (USNM).

This is the species described as *cruenta* LeConte by Dobzhansky (1941). I have seen the type of *H. cruenta* and it is not this species; therefore, I provide the name *H. schaefferi*, honoring Charles Schaeffer who collected most of the specimens in the type series. The color pattern of *H. schaefferi* is very similar to that of *H. nevadica*,

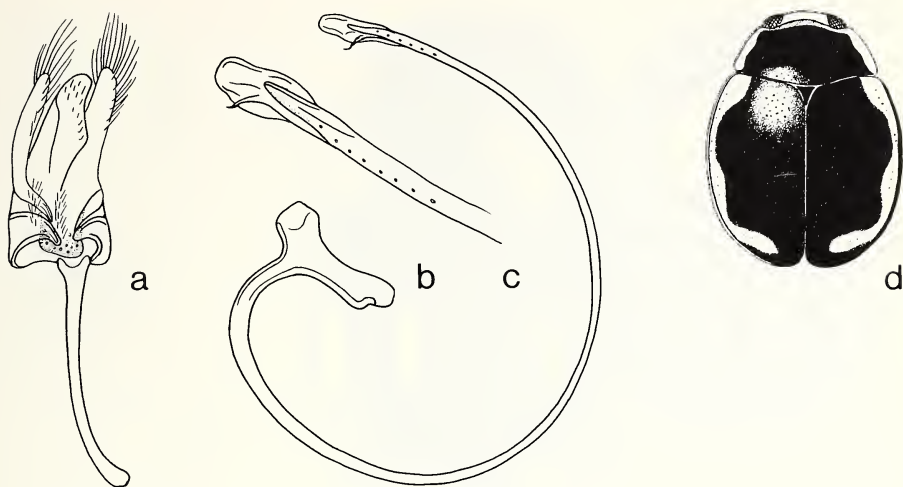


Fig. 406. *Hyperaspis limbalis*.

but, in addition to the genitalic differences, the anterior margin of the male pronotum is black in *H. nevadica*, and the yellow area of the elytron not as wide as in *H. schaefferi* (see comments under *caseyi*).

Hyperaspis limbalis Casey

Fig. 406a–d; Map, Fig. 404

Hyperaspis limbalis Casey, 1899, p. 126.—Korschefsky, 1931, p. 191.—Dobzhansky, 1941, p. 54.

Diagnosis. Length 1.90 to 2.50 mm, width 1.50 to 1.80 mm. Form elongate, oval, depressed. Elytron black with narrow lateral vitta from base nearly to apex, apex of vitta narrowed from lateral margin of elytron (Fig. 406d). Postcoxal line nearly reaching hind margin of first abdominal sternum, evenly curved throughout, area within line smooth, distinctly punctured. Male genitalia as in Figure 406a–c.

Discussion. *Hyperaspis limbalis* was considered a junior synonym of “*fimbriolata*” (*inflexa*) by Dobzhansky (1941), but the male genitalia are not those of *H. inflexa*, in addition, the elongate, depressed form and the elytral vittae removed from the elytral border apically are characters at variance with *H. inflexa* and *H. caseyi*, n. sp. I have seen only the male type (Casey collection) and a single female of this species, both from San Diego.

Type locality. San Diego, California.

Type depository. USNM (35186).

Distribution. Figure 404. CALIFORNIA: type locality.



Fig. 407. *Hyperaspis filiola*.

Hyperaspis filiola Casey
Fig. 407; Map, Fig. 409

Hyperaspis filiola Casey, 1908, p. 419.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 188.—Dobzhansky, 1941, p. 68.

Diagnosis. Length 2.20 mm, width 1.50 mm. Form elongate, nearly parallel sided, subdepressed. Female pronotum entirely black. Elytron with complete marginal vitta and elongate, oval discal spot (Fig. 407). Postcoxal line not approaching hind margin of first abdominal sternum, evenly curved throughout, area within line alutaceous, coarsely punctured.

Discussion. The correct placement of *H. filiola* is open to question because I have seen only the female type. The slender body form is very similar to that of *H. punctata* and *H. paludicola* as noted by Dobzhansky (1941), however, the female pronotum is entirely black, and therefore I tentatively place it in the *fimbriolata* group near *H. limbalis*. In any case, it is a very distinctive little species which should be recognized without difficulty if the color pattern proves to be consistent. The type in the Casey collection is a unique female (holotype).

Type locality. Nogales, Arizona.

Type depository. USNM (35205).

Distribution. Figure 409. ARIZONA: type locality.

Hyperaspis binaria Casey
Fig. 408a-d; Map, Fig. 409

Hyperaspis binaria Casey, 1924, p. 165.—Korschefsky, 1931, p. 185.

Hyperaspis taeniata binaria: Dobzhansky, 1941, p. 49.

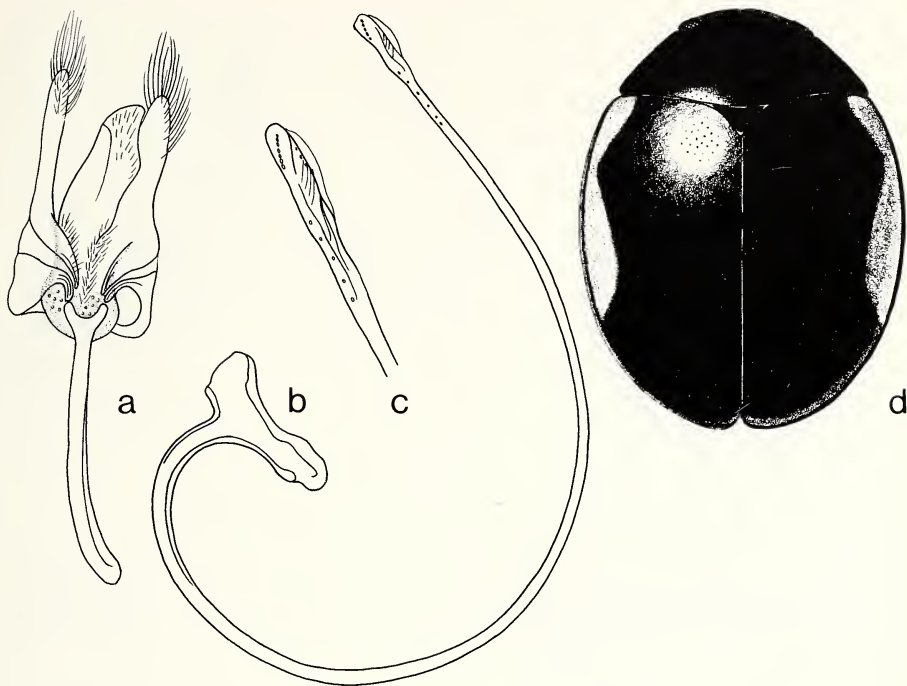


Fig. 408. *Hyperaspis binaria*.

Hyperaspis taeniata cruentoides Dobzhansky, 1941, p. 48. **New Synonymy.**

Diagnosis. Length 2.60 to 3.0 mm, width 2.0 to 2.40 mm. Form elongate, oval, slightly flattened dorsoventrally. Pronotum of male narrowly yellow on lateral and anterior margins; pronotum of female black. Elytron immaculate or with elongate yellow spot of varying size on lateral margin (Fig. 408d). Postcoxal line nearly reaching hind margin of first abdominal sternum, outer $\frac{1}{3}$ angulate, area within line alutaceous, impunctate. Male genitalia as in Figure 408a–c.

Discussion. Specimens of this species are extremely rare in collections, and males particularly so. The type of *H. taeniata cruentoides* is a male, but the abdomen has been removed and with it the genitalia, so they are not available for comparative purposes. I am establishing this synonymy mainly on the basis of the similarity in external characteristics because only one male was available for study. However, the size, type of dorsal punctation, and the postcoxal lines are the same for both *binaria* and *cruentoides*, therefore I regard *cruentoides* as a junior synonym. The type of *H. binaria* is a unique female (holotype) in the Casey collection.

Type locality. Of *binaria*, Southern Pines, North Carolina; of *cruentoides*, Bartow Junction, Florida.

Type depository. Of *binaria* (35180) and *cruentoides* (54210), USNM.

Distribution. Figure 409. FLORIDA: type locality; Ft. Walton.

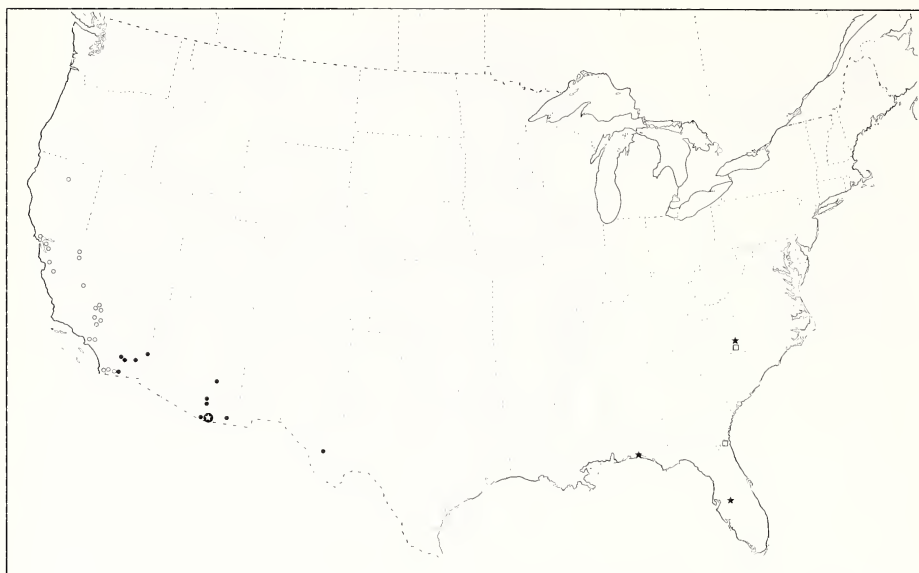


Fig. 409. Distribution. *Hyperaspis filiola* (circled star); *H. binaria* (star); *H. uniformis* (square); *H. bensonica* (dot); *H. psyche* (open dot).

Hyperaspis uniformis Casey

Fig. 410a-d; Map, Fig. 409

Hyperaspis uniformis Casey, 1924, p. 162.—Korschefsky, 1931, p. 199.—Dobzhansky, 1941, p. 38.

Diagnosis. Length 3.70 mm, width 2.75 mm. Form elongate, oval, dorsoventrally flattened. Male pronotum black medially, lateral $\frac{1}{4}$ and narrow anterior border reddish yellow. Elytron immaculate (Fig. 410d). Postcoxal line not reaching hind margin of first abdominal sternum, slightly flattened along margin, area within line alutaceous, impunctate. Male genitalia as in Figure 410a-c.

Discussion. The combination of large size, large yellow areas on the pronotum,

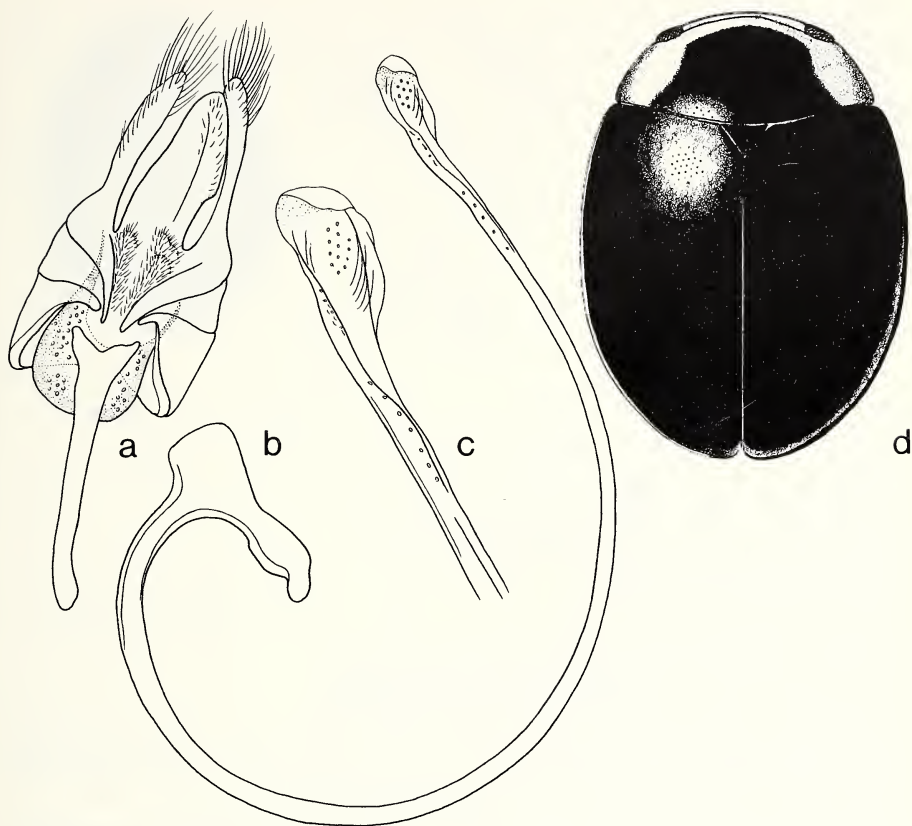


Fig. 410. *Hyperaspis uniformis*.

and the elongate, dorsoventrally flattened form make *H. uniformis* an outstanding species in the eastern North American fauna. The affinities are obviously with *H. binaria*, but they are quite different species. Casey described *H. uniformis* from 2 male specimens, the second of which is *H. binaria* rather than *H. uniformis*. This is an extremely rarely collected species, I have seen only 2 examples.

Type locality. Southern Pines, North Carolina.

Type depository. USNM (35189).

Distribution. Figure 409. FLORIDA: Nassau Co., Fernandina Beach. NORTH CAROLINA: Southern Pines.

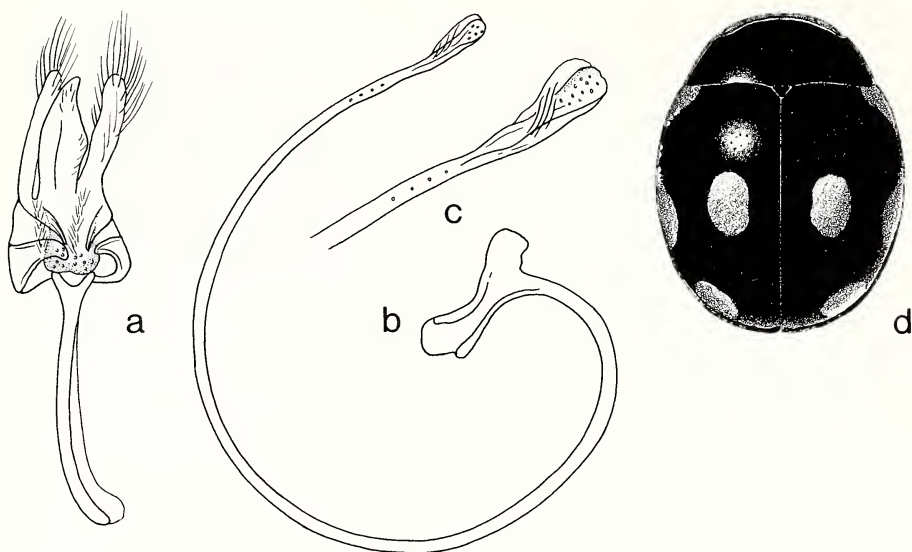


Fig. 411. *Hyperaspis bensonica*.

Hyperaspis bensonica Casey

Fig. 411a-d; Map, Fig. 409

Hyperaspis bensonica Casey, 1908, p. 418.—Leng, 1920, p. 212.—Casey, 1924, p. 166.—Korschefsky, 1931, p. 184.

Hyperaspis bensonica bensonica: Dobzhansky, 1941, p. 8.

Diagnosis. Length 1.90 to 2.90 mm, width 1.50 to 2.35 mm. Form oval, somewhat rounded, convex. Pronotum of male with lateral and anterior margin narrowly yellow. Elytron with discal spot and lateral vitta, vitta sometimes interrupted to form apical spot and/or humeral and apical spots (Fig. 411d). Postcoxal line nearly reaching hind margin of first abdominal sternum, flattened along margin, apical $\frac{1}{3}$ angulate, area within line smooth, distinctly punctured. Male genitalia as in Figure 411a-c.

Discussion. The external appearance of *H. bensonica* is identical to that of some examples of *H. disrupta*, but the male genitalia are so different that I have placed them in separate groups even though the females are apparently inseparable. As usual in both the *fimbriolata* and *taeniata* groups, male genitalia must be examined to determine species. See also comments under *H. psyche* and *H. disrupta*. The type of *H. bensonica* is a unique male (holotype) in the Casey collection.

Type locality. Benson, Cochise Co., Arizona.

Type depository. USNM (35205).

Distribution. Figure 409. ARIZONA: Cochise Co., Benson; Globe; Santa Catalina Mts.; St. Cruz Co., Nogales; Tucson. CALIFORNIA: Palm Springs; Riverside Co., Riverside; San Bernardino Co., Kelso Dunes; Vidal; San Jacinto Mts.; Pinon Flat. TEXAS: Davis Mts.

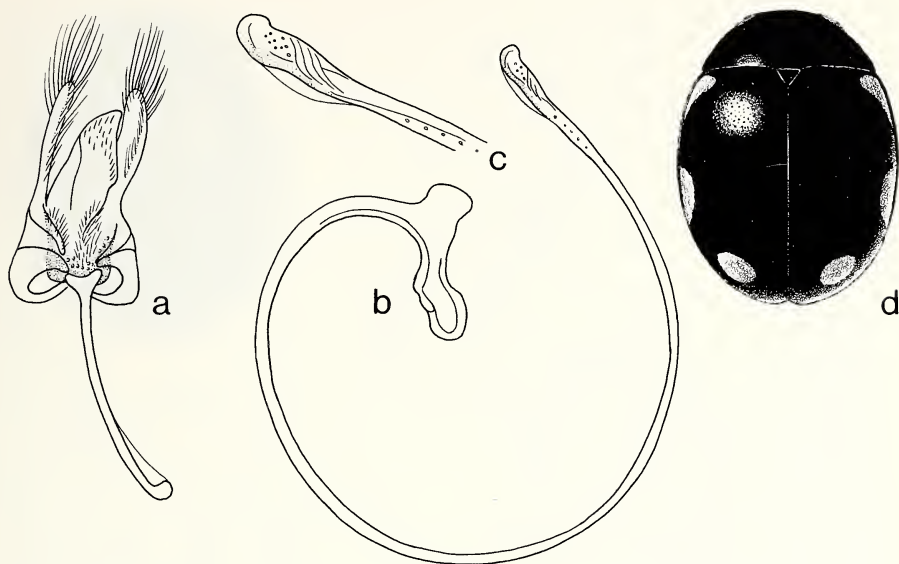


Fig. 412. *Hyperaspis psysche*.

Hyperaspis psysche Casey
Fig. 412a-d; Map, Fig. 409

Hyperaspis psysche Casey, 1899, p. 125.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 194.—Dobzhansky, 1941, p. 60.

Diagnosis. Length 2.0 to 2.85 mm, width 1.60 to 2.0 mm. Form elongate, oval, moderately convex. Pronotum of male narrowly yellow laterally. Elytron with 3 spots on lateral margin (Fig. 412d). Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved, area within line smooth, coarsely punctured. Male genitalia as in Figure 412a-c. Female genitalia as in Figure 412d.

Discussion. The combination of a black pronotum in the female and the elytron with 3 marginal spots will usually enable this species to be recognized, however, I am not certain that *H. psysche* and *H. bensonica* should be maintained as 2 valid species. The male genitalia of *H. psysche* are extremely similar to those of *H. bensonica*, but each genitalia examined differed slightly from the next in both of these species, therefore I cannot make a definite statement of synonymy based on genitalia. Normally the color patterns will separate these species, but I have seen examples of “*psysche*” from Fort Tejon and Lebec, California, which show traces of the discal spot of *H. bensonica* and an example of “*bensonica*” from Portal, Arizona, in which the discal spot is lacking but the marginal vitta is not broken. For the present I prefer not to alter the existing classification in this case. There are 2 female types of *H. psysche* in the Casey collection, one of which I designate and label as the lectotype, the other as a paralectotype.

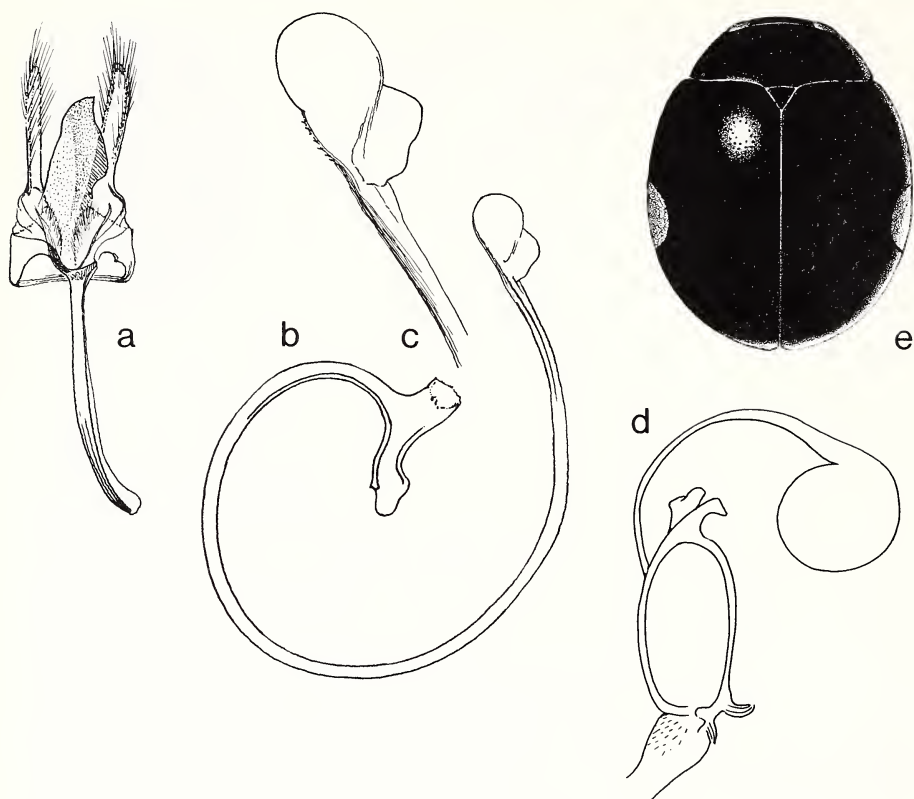


Fig. 413. *Hyperaspis pleuralis*.

Type locality. Alameda Co., California (lectotype here designated).

Type depository. USNM (35184).

Distribution. Figure 409. CALIFORNIA: Alameda Co., Oakland Hills; Bear Valley; Berkeley; Cajon; Kaweah; Kern Co., Mt. Pinos; Lebec; Los Angeles Co., Tanbark Flat; Marcel; Marin Co., Fairfax; Mariposa Co.; Pasadena; Pinnacles Nat. Park; San Diego; San Jacinto Mts.; Santa Clara Co.; Sequoia Nat. Park; Shasta Co., Brown Butte; Tulare Co.; Visalia.

Hyperaspis pleuralis Casey

Fig. 413a-e; Map, Fig. 414

Hyperaspis pleuralis Casey, 1899, p. 125.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 194.—Dobzhansky, 1941, p. 50.

Hyperaspis aterrima Casey, 1908, p. 416.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 184. **New Synonymy.**

Hyperaspis falli Nunenmacher, 1912, p. 450.—Korschefsky, 1931, p. 188. **New Synonymy.**

Hyperaspidius falli: Dobzhansky, 1941, p. 86.

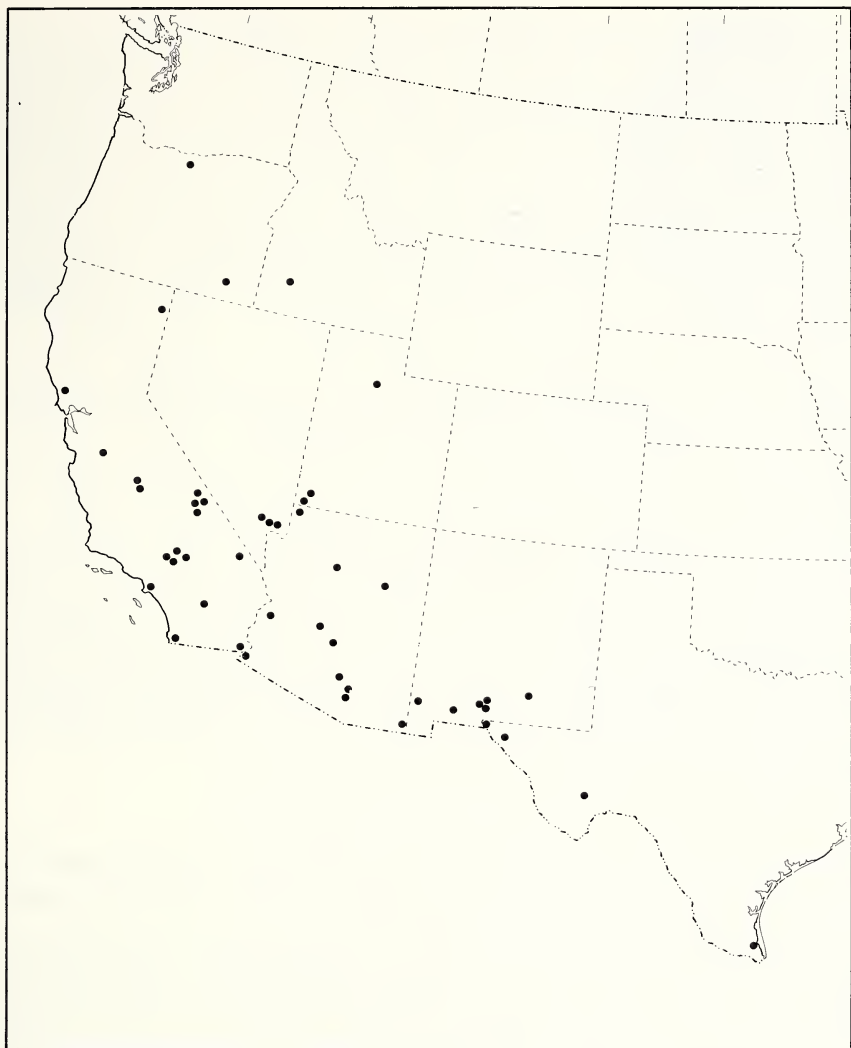


Fig. 414. Distribution. *Hyperaspis pleuralis*.

Hyperaspis pleuralis var. *aterrima*: Dobzhansky, 1941, p. 51.

Hyperaspis barri Hatch, 1961, p. 161. **New Synonymy.**

Diagnosis. Length 1.95 to 2.85 mm, width 1.40 to 2.15 mm. Form oval, slightly truncate at apex. Pronotum of male with narrow lateral or anterolateral area yellow. Elytron entirely black or with single red or yellow spot of varying size on lateral margin (Fig. 413e). Postcoxal line nearly reaching posterior margin of first abdominal sternum, evenly curved, area within line smooth, coarsely punctured. Male genitalia as in Figure 413a–c. Female genitalia as in Figure 413d.

Discussion. This species most nearly resembles *H. significans* and occurs in the same general region with that species. The presence of a maculate form and an immaculate form is a parallel situation to that discussed under *H. significans*, except in this case occasional intergrades occur. There are 11 types of *pleuralis* in the Casey collection, and I here designate and label a male as the lectotype, the remainder as paralectotypes. There are 5 types of *H. aterrima* in the Casey collection and I here designate and label a male as the lectotype, the remainder as paralectotypes. *Hyperaspis barri* Hatch is a junior synonym of *H. pleuralis*. *Hyperaspis falli* Nunenmacher is also a junior synonym of *H. pleuralis*. There are supposed to be 2 type specimens and I have seen one of these, a male labeled "Esmeralda Co., Nev. VI-10-08/Coll'd by F. W. Nunenmacher/male sign/Hyperaspis falli. Type", which I designate and label as the lectotype.

Type locality. Of *pleuralis*, El Paso, Texas (lectotype here designated); of *aterrima*, St. George, Utah (lectotype here designated); of *barri*, Snake River, Mt. Home, Idaho; of *falli*, Esmeralda Co., Nevada (lectotype here designated).

Type depository. Of *pleuralis* (35178) and *aterrima* (35183), USNM; of *barri*, CAS; of *falli*, CAS.

Distribution. Figure 414. ARIZONA: Eloy; Yuma Co., Hope; Hot Springs; Littlefield; Oracle; Phoenix; Portal; Tucson; Williams; Winslow; Yuma. CALIFORNIA: Amedee; Baker; Death Valley; Fresno Co., Coalinga; Imperial Co.; Indio; Inyo Co., Little Lake, Lone Pine; Inyo Mts.; Kern Co.; Lebec; Los Angeles Co.; Merced Co., Dos Palos; Mojave; Sonoma Co., Occidental; Palm Springs; Saltdale; San Diego Co. NEVADA: Glendale; Mesquite; Overton. NEW MEXICO: Cloudcroft; Dona Ana Co.; Deming; La Luz; Lordsburg; Mesilla Park. OREGON: Harney Co.; Wasco. TEXAS: Finlay; El Paso; Pecos Co., Ft. Stockton; Pt. Isabel. UTAH: Hurricane; St. George; Salt Lake.

taeniata group

Female pronotum entirely black; body form oval (except rounded, convex in *H. disrupta*); color pattern of elytron with marginal vitta usually incomplete; basal lobe of male genitalia with lateral projection in basal '.

As indicated in the species discussions following, this group as conceived here is composed of species with variable, overlapping color patterns. The genitalia are not as distinctive as in most other groups of *Hyperaspis*, and I have doubts as to whether the classification proposed here is correct; studies of the biology and immature stages are needed to test this classification.

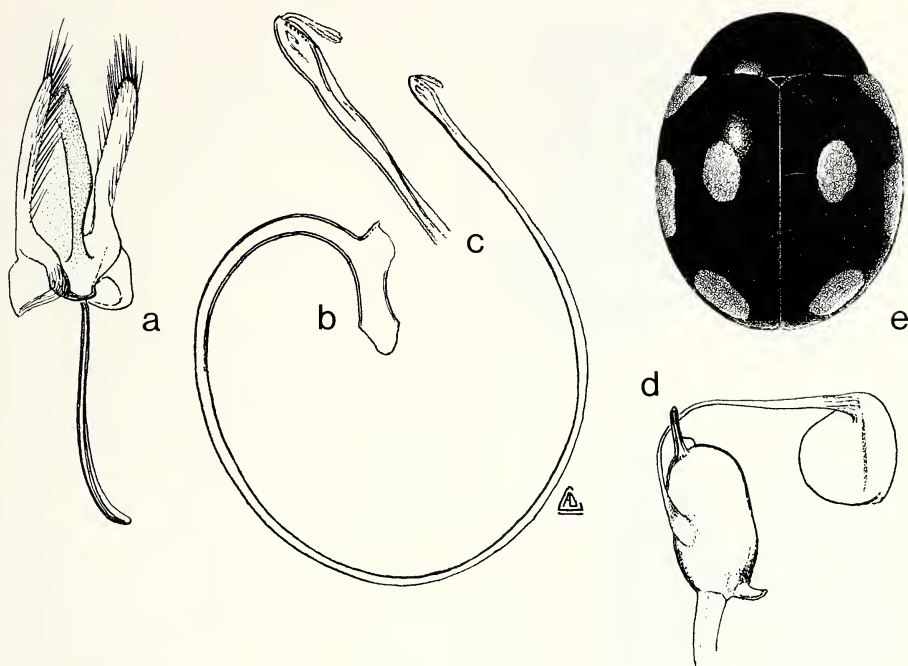


Fig. 415. *Hyperaspis disrupta*.

Hyperaspis disrupta Dobzhansky

Fig. 415a-e; Map, Fig. 416

Hyperaspis bensonica disrupta Dobzhansky, 1941, p. 9.

Diagnosis. Length 1.60 to 1.80 mm, width 1.45 to 1.50 mm. Form rounded, convex. Male pronotum with anterior and lateral border narrowly yellow. Elytron with discal and apical spots, lateral vitta entire to midpoint, or broken into 2 spots (Fig. 415e). Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved throughout, area within line alutaceous, deeply, coarsely punctured. Male genitalia as in Figure 415a-c. Female genitalia as in Figure 415d.

Discussion. Because of the different type of male genitalia, I consider *H. disrupta* a valid species rather than a subspecies of *H. bensonica* (see comments under *H. bensonica*). Some examples of *H. taeniata* have the discal spot on the elytron free as in *H. disrupta* and *H. bensonica*. Both of the latter species are more convex and rounded than *H. taeniata*, and the lateral vitta on the male pronotum is narrower.

Type locality. Kern County, California.

Type depository. CAS.

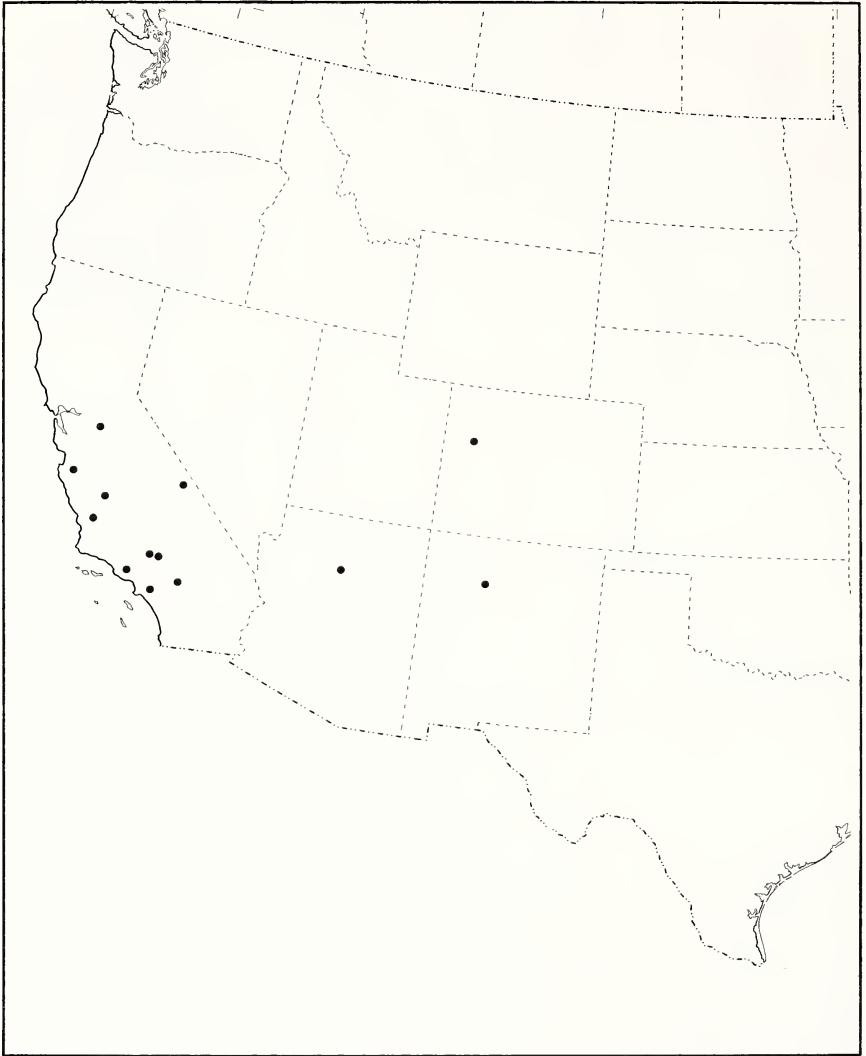


Fig. 416. Distribution. *Hyperaspis disrupta*.

Distribution. Figure 416. ARIZONA: Coconino Co. CALIFORNIA: Coalinga; Hesperia; Inyo Co., Westgard Pass Plateau; Kern Co.; Lebec; Pasadena; Pinnacles Nat. Park; Ventura Co.; San Joaquin Co., Lodi; S. Luis Obispo Co. COLORADO: Glenwood Springs. NEW MEXICO: Jemez Mts.

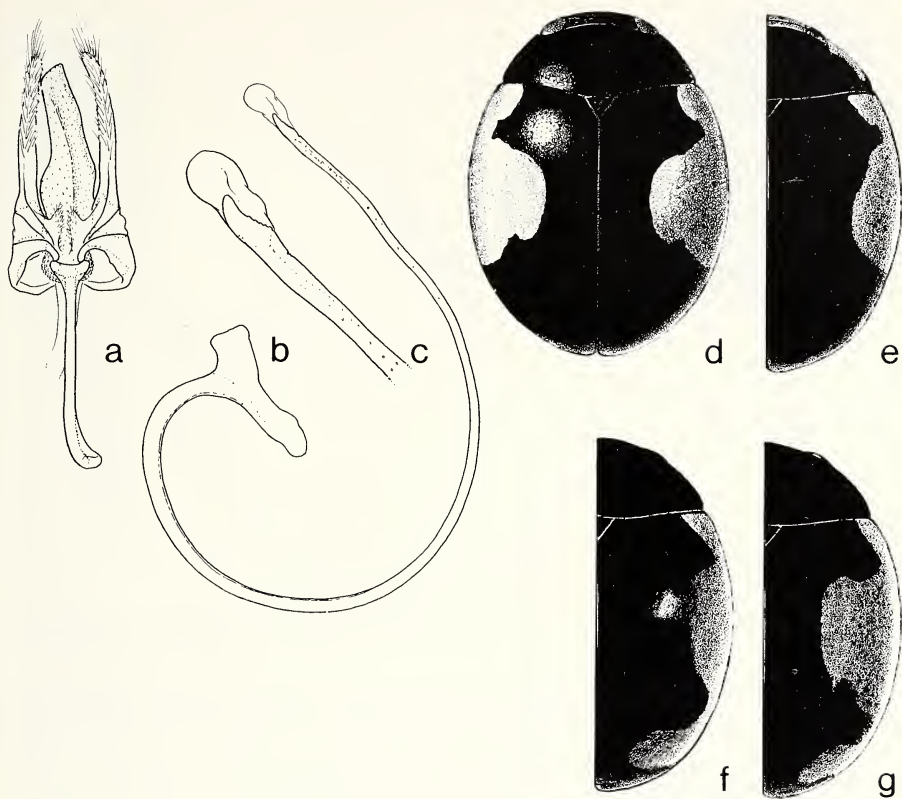


Fig. 417. *Hyperaspis taeniata*.

Hyperaspis taeniata LeConte

Fig. 417a-g; Map, Fig. 418

Hyperaspis taeniata LeConte, 1852, p. 134.—LeConte, 1880, p. 187.—Crotch, 1873, p. 379.—Crotch, 1874b, p. 234.—Casey, 1899, p. 125.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 197.

Hyperaspis taeniata taeniata: Dobzhansky, 1941, p. 43.

Hyperaspis taeniata var. *pallidula* Dobzhansky, 1941, p. 45. **New Synonymy.**

Hyperaspis taeniata var. *pallescent* Dobzhansky, 1941, p. 46. **New Synonymy.**

Hyperaspis taeniata bipunctata Malkin, 1955, p. 29. **New Synonymy.**

Diagnosis. Length 2.20 to 3.0 mm., width 1.70 to 2.20 mm. Form oval, moderately convex. Pronotum of male narrowly yellow on lateral border. Elytron with large yellow spot on lateral margin, spot extending onto disc medially, variable (Fig. 417d-g), discal spot occasionally free. Postcoxal line not reaching hind margin of first abdominal sternum, slightly flattened along margin, outer $\frac{1}{3}$ angulate, area within line smooth, distinctly punctured. Male genitalia as in Figure 417a-c.

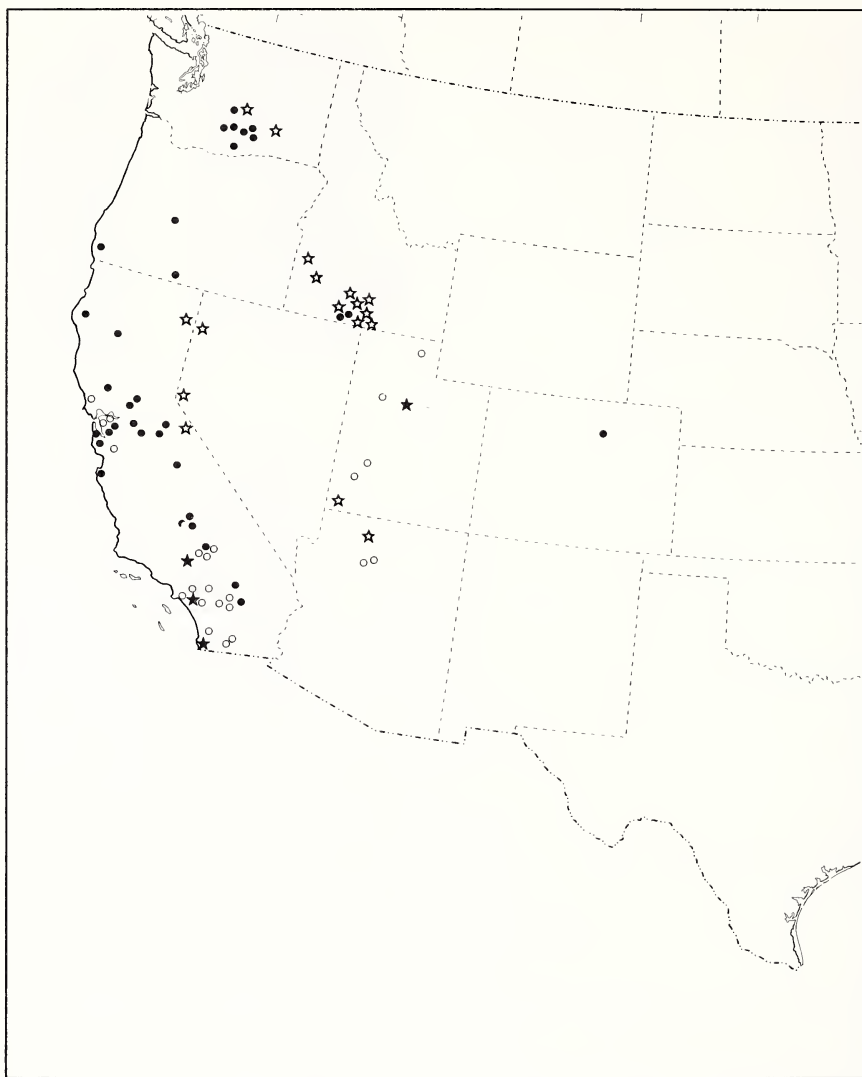


Fig. 418. Distribution. *Hyperaspis taeniata* (open circle); *H. dissoluta dissoluta* (dot); *H. dissoluta nevadica* (open star); intergrades between *H. taeniata* and *H. dissoluta nevadica* (star).

Discussion. The dorsal color pattern is reasonably constant in specimens from southern California, becoming more variable in specimens from Arizona and Utah. However, the variation in color occurs within populations and also over a broad geographic area, thus not permitting a breakdown into subspecies as proposed by Dobzhansky (1941). The male genitalia also do not vary in a pattern to indicate subspecies, therefore I regard all forms as a single species (see comments under *H. dissoluta*). The type of *H. taeniata* is a unique female (holotype) labeled "(gold disc)/

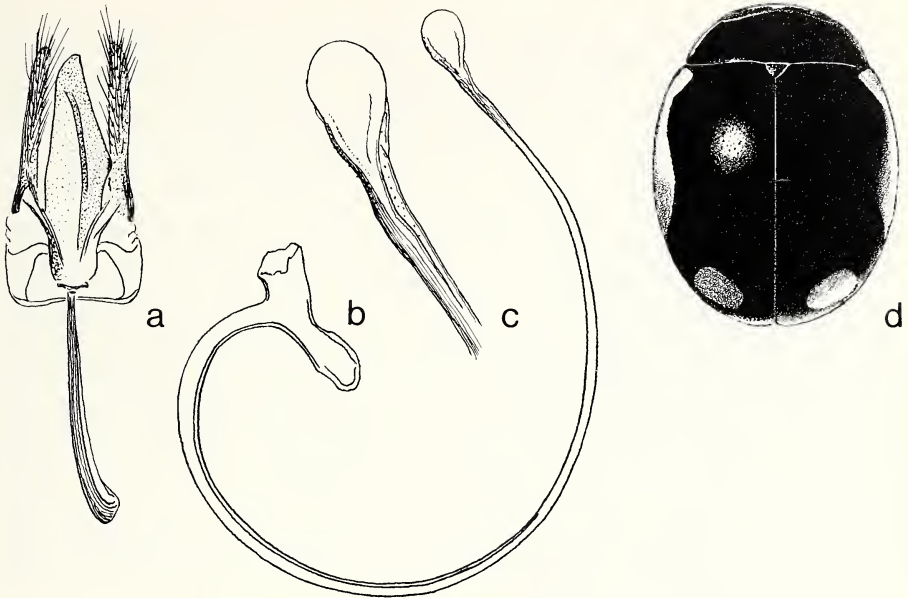


Fig. 419. *Hyperaspis dissoluta dissoluta*.

4665/Type 6708 (red paper)/*H. taeniata* LeC.”. *Hyperaspis taeniata bipunctata* Malkin cannot be maintained as a subspecies because this form occurs at some of the same localities with other variations of *H. taeniata*.

Type locality. Of *taeniata*, San Diego, California; of *pallidula*, Kern Co., California, of *pallescent*, Hualapai Mountains, Arizona; of *bipunctata*, Garriby Creek, Contra Costa Co., California.

Type depository. Of *taeniata*, MCZ; of *pallidula*, USNM (54207); of *pallescent*, and *bipunctata*, CAS.

Distribution. Figure 418. ARIZONA: Coconino Co.; 5 mi W of the Gap. CALIFORNIA: Cajon Pass; Claremont; Kern Co., Isabella, Short Cyn., Inyokern; Little Rock; Mojave; Palmdale; Palm Springs; Pinon Flat; Poway; Redondo; Riverside Co., Riverside; San Diego; San Jacinto Mts; Santa Clara Co., Verdemont. UTAH: Milford; Millard Co., Garrison; Ogden; Provo; Toole Co., Dugway Pr. Gd.

Hyperaspis dissoluta dissoluta Crotch

Fig. 419a–d; Map, Fig. 418

Hyperaspis dissoluta Crotch, 1873, p. 379.—LeConte, 1880, p. 187.—Casey, 1899, p. 126.—Korschefsky, 1931, p. 187.—Belicek, 1976, p. 315.

Hyperaspis dissoluta dissoluta: Dobzhansky, 1941, p. 58.

Hyperaspis coloradana Casey, 1908, p. 417.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 186. **New Synonymy.**

Hyperaspis dissoluta coloradana: Dobzhansky, 1941, p. 59.

Hyperaspis nupta Casey, 1899, p. 126.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 193.—Dobzhansky, 1941, p. 56 (as synonym of *cincta* LeConte). **New Synonymy.**

Diagnosis. Length 2.0 to 2.75 mm, width 1.40 to 2.0 mm. Form elongate, oval, moderately convex. Pronotum of male with lateral border narrowly yellow, anterior border black or narrowly yellow. Elytron with lateral vitta and apical spot (Fig. 419d). Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved, area within line distinctly punctured. Male genitalia as in Figure 419a-c.

Discussion. Normally *H. d. dissoluta* can be recognized by the dorsal color pattern, however, specimens of *H. d. dissoluta* and *H. taeniata* occur which have the same color pattern. This does not occur in a geographic pattern, but only sporadically, and these specimens are difficult to name because the male genitalia are very similar. Examples of *H. fimbriolata* and *H. inflexa* which have the lateral vitta on the elytron broken in the apical $\frac{1}{3}$ are also difficult to separate from *H. d. dissoluta*, but here the male genitalia are distinctive. I cannot maintain the name *coloradana* even as a subspecies of *dissoluta* because the male genitalia of the 2 forms are identical and supposed differences (body size and elytral color pattern) do not show any sort of geographic stability. *Hyperaspis nupta* Casey is also a junior synonym of *dissoluta* rather than of *cincta* LeConte as supposed by Dobzhansky (1941). The type of *H. dissoluta* should be in the MCZ collection but could not be located. The type of *H. coloradana* is a unique male (holotype) in the Casey collection. There are 2 male types of *H. nupta* in the Casey collection, one of which I here designate as the lectotype, the other as a paralectotype.

Type locality. Of *dissoluta*, California; of *coloradana*, Boulder, Colorado; of *nupta*, Hoopa Valley, Trinity River, Humboldt Co., (Fort Gaston), California (lectotype here designated).

Type depository. of *dissoluta*, not located; of *coloradana*, USNM (35187); of *nupta*, USNM (35188).

Distribution. Figure 418. CALIFORNIA: Bakersfield; Carmel; Contra Costa Co.; Davis; Kaweah; Kern Co., Edison; Kings. Riv. Cn.; Lakeport; Los Angeles Co.; Mariposa Co; Modesto; Oakland; Palo Alto; Piedmont; Sacramento; San Joaquin Co., Lodi; San Mateo; Sequoia Nat. Park; Tehama Co., Red Bluff; Tulare Co., Lindsey; Victorville; Tuolumne Co. IDAHO: Ada Co., Boise; Hot Creek Falls. OREGON: Curry Co., Cape Sebastian St. Pk.; Lake Co., Paisley; Redmond. WASHINGTON: Benton Co., Hanford Works; Grand Coulee; Moses Canyon; Ellensburg; Yakima R. Canyon; Neppel; Vantage Ferry; Wenatchee.

Hyperaspis dissoluta nevadica Casey, new combination
Fig. 420a-d; Map, Fig. 418

Hyperaspis nevadica Casey, 1899, p. 125.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 192.

Hyperaspis taeniata nevadica: Dobzhansky, 1941, p. 44.

Diagnosis. Length 2.30 to 3.10 mm, width 1.70 to 2.10 mm. Form oval, moderately convex. Pronotum of male narrowly yellow on lateral border. Elytron with single, yellow, elongate spot on lateral margin (Fig. 420d). Postcoxal line reaching hind margin of first abdominal sternum, briefly flattened along margin, outer $\frac{1}{3}$ angulate, area within line smooth, densely punctured. Male genitalia as in Figure 420a-c.

Discussion. I consider *H. nevadica* a subspecies of *H. dissoluta* rather than a sub-

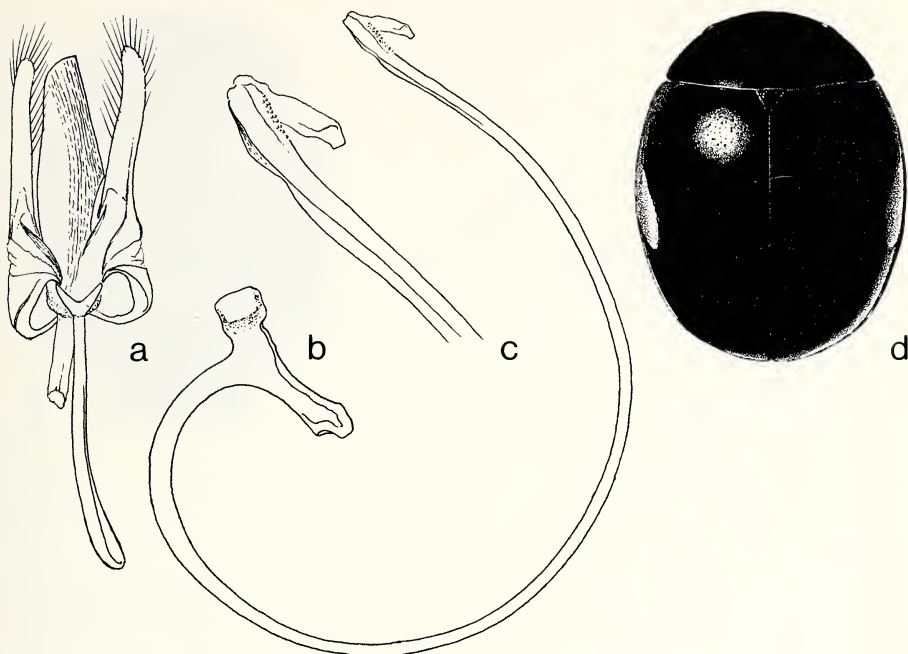


Fig. 420. *Hyperaspis dissoluta nevadica*.

species of *H. taeniata* as did Dobzhansky (1941). In addition to the genitalic differences, *H. nevadica* is more slender in body form than *H. taeniata*, the postcoxal line is angulate and the elytral color pattern is constant. These subspecies are also justified by the geographic distribution. The type in the Casey collection is a unique female (holotype).

Type locality. Washoe Co., 4,400 ft., Reno, Nevada.

Type depository. USNM (35179).

Distribution. Figure 418. ARIZONA: Bright Angel. CALIFORNIA: Amedee; Inyo Co., Lone Pine. IDAHO: Bliss; Boise City; Buhl; Burley; Castleford; Declo; Gooding; Hammett; Jerome; Oakley; Paul; Twin Falls. UTAH: Chad's Ranch. WASHINGTON: Vernita; Wenatchee.

nunenmacheri group

Female pronotum black; area within postcoxal line densely, coarsely punctured; basal lobe of male genitalia much shorter than paramere, apex obliquely truncate.

The single species in this group, *H. nunemacheri*, would superficially appear to belong in the *postica* group, but the male genitalia are not of the *postica* type, and the female pronotum is entirely black; therefore, I propose a separate group for this species.

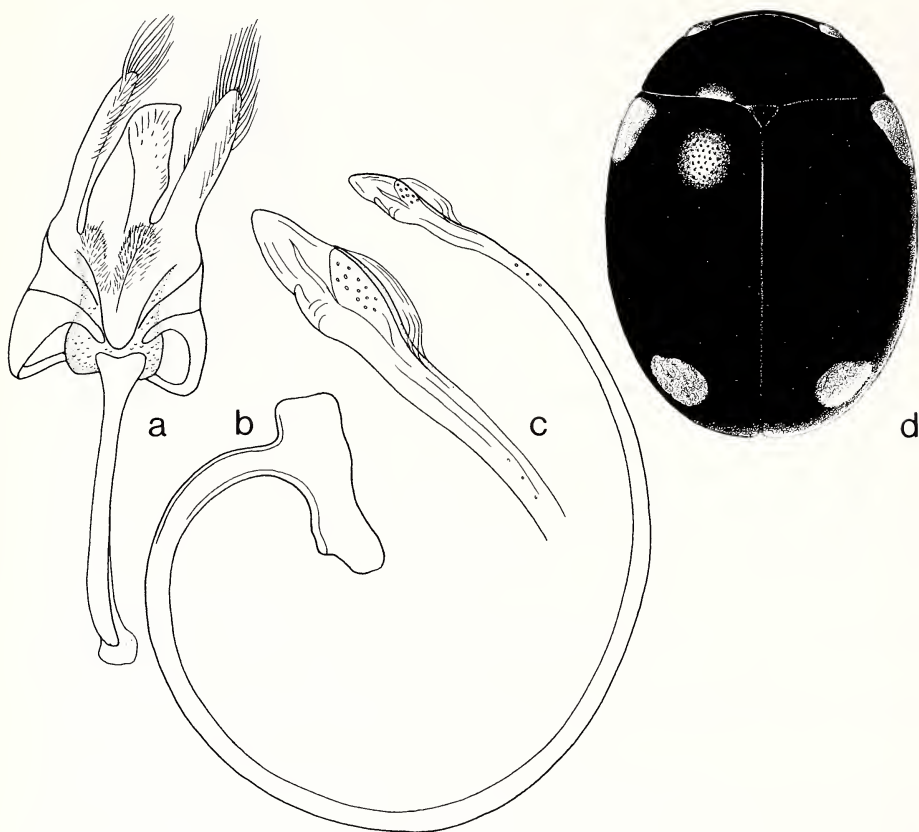


Fig. 421. *Hyperaspis nunenmacheri*.

Hyperaspis nunenmacheri Casey

Fig. 421a-d; Map, Fig. 422

Hyperaspis nunenmacheri Casey, 1908, p. 417.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 193.—Dobzhansky, 1941, p. 40.

Diagnosis. Length 2.70 to 3.50 mm, width 2.0 to 2.40 mm. Form elongate, broadly oval, somewhat convex. Pronotum of female entirely black. Elytron black with 2 yellow spots, one humeral, one apical (Fig. 421d). Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved throughout, area within line densely, coarsely punctured. Male genitalia as in Figure 421a-c.

Discussion. The combination of large size, dorsal color pattern, and the dense, coarse punctation within the postcoxal line is unique within North American *Hyperaspis*. This species would appear to belong in the *postica* group, but the male genitalia are not of the *postica* type and the female pronotum is entirely black. Therefore, I place *H. nunenmacheri* in a monotypic group. The holotype is a unique female in the Casey collection.

Type locality. Riverside, California.

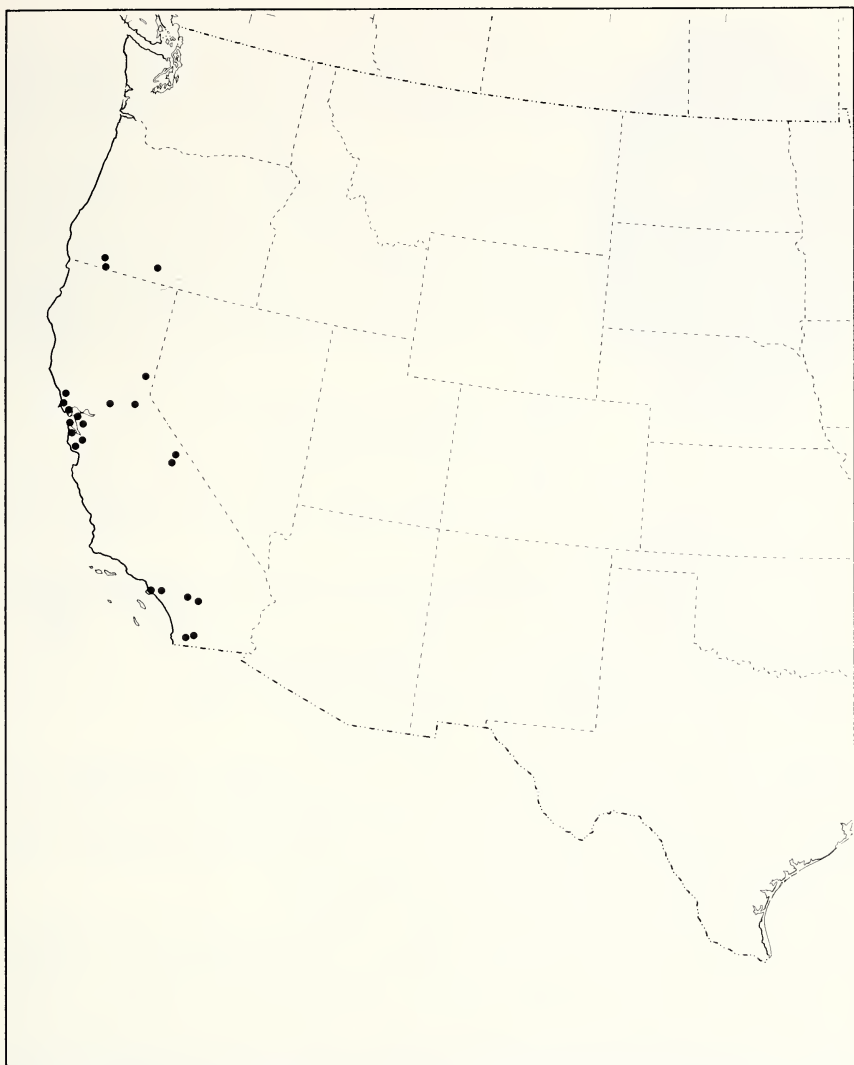


Fig. 422. Distribution. *Hyperaspis nunenmacheri*.

Type depository. USNM (35196).

Distribution. Figure 422. CALIFORNIA: Alameda Co., Lake Anza; Contra Costa Co.; Eldorado Co.; Folsom; Inyo Co., Independence, Mazurka Canyon; Los Angeles; Marin Co.; Mt. Wilson; Plumas Co.; Ribbonwood; Jan Jacinto Mts.; Riverside Co., Thomas Camp; San Diego Co., Morena Lake, Mt. Laguna; San Francisco; San Mateo Co.; Santa Clara Co.; Santa Cruz Co., Ben Lomond; Santa Rosa; Sonoma Co., Rio Nido; Occidental. OREGON: Ashland; Jackson Co., Colestin; Valley Falls; Che-waucan River.

postica group

Pronotum of both male and female narrowly yellow on lateral margin; body form elongate, oval, somewhat flattened dorsoventrally; basal lobe of male genitalia with border emarginate, emargination variable, extending from apex to apical $\frac{1}{4}$ or basal $\frac{5}{6}$.

This group is the most difficult in the taxonomic sense of all the groups of *Hyperaspis*. After examining the genitalia of more than 300 specimens, I have maintained the same basic classification here as that of Dobzhansky (1941) and El-Ali (unpubl. dissertation). However, I am reasonably certain that biological studies will alter this classification to some degree, and this is an area where such studies are needed to provide information that cannot be obtained from examination of museum specimens.

Hyperaspis postica LeConte

Fig. 423a-c; Map, Fig. 424

Hyperaspis postica LeConte, 1880, p. 188.—Casey, 1899, p. 127.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 194.—Dobzhansky, 1941, p. 38.—Hatch, 1961, p. 160.—Belicek, 1976, p. 312.

Hyperaspis elliptica Casey, 1899, p. 126.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 188.—Dobzhansky, 1941, p. 39.—Hatch, 1961, p. 160.—Belicek, 1976, p. 313.

New Synonymy.

Hyperaspis elliptica var. *angustula* Casey, 1899, p. 127.

Hyperaspis angustulata (misspelling): Korschefsky, 1931, p. 188.

Hyperaspis essigi Malkin, 1955, p. 29. **New Synonymy.**

Diagnosis. Length 2.30 to 3.10 mm, width 1.70 to 2.25 mm. Form elongate, oval. Elytron with single apical spot varying in size and shape (Fig. 423e). Postcoxal line reaching hind margin of first abdominal sternum, flattened along margin, outer $\frac{1}{3}$ angulate, area within line alutaceous, distinctly punctured. Male genitalia variable as in Figure 423a-c. Female genitalia as in Figure 423d.

Discussion. *Hyperaspis postica* most nearly resembles *H. oculaticauda* which is a consistently smaller species. Male genitalia (see comments under *H. oculaticauda*) must be examined to positively distinguish examples of these 2 species from each other. When male genitalia of a few specimens of *H. postica* are examined, it appears that more than one species is involved, however, when dozens of genitalia are examined, the division lines can no longer be maintained because intergrades are always present. Therefore what I call *H. postica* here is either a single species with highly variable male genitalia, or is a mixture of 2 or more mostly allopatric species. In the latter event both *elliptica* Casey and *essigi* Malkin may be valid, but for the present I regard both as junior synonyms of *postica*. LeConte (1880) had more than one type specimen of *H. postica*, but did not state how many. There are now 15 specimens in his collection and I cannot determine which of these other than the lectotype are really type material so I do not designate any paralectotypes. I designate and label as the lectotype a female labeled "Cal./Hardy/Type 6716 (red paper)/*H. postica* LeC." The Casey types of both *elliptica* and *angustula* are unique females (holotypes).

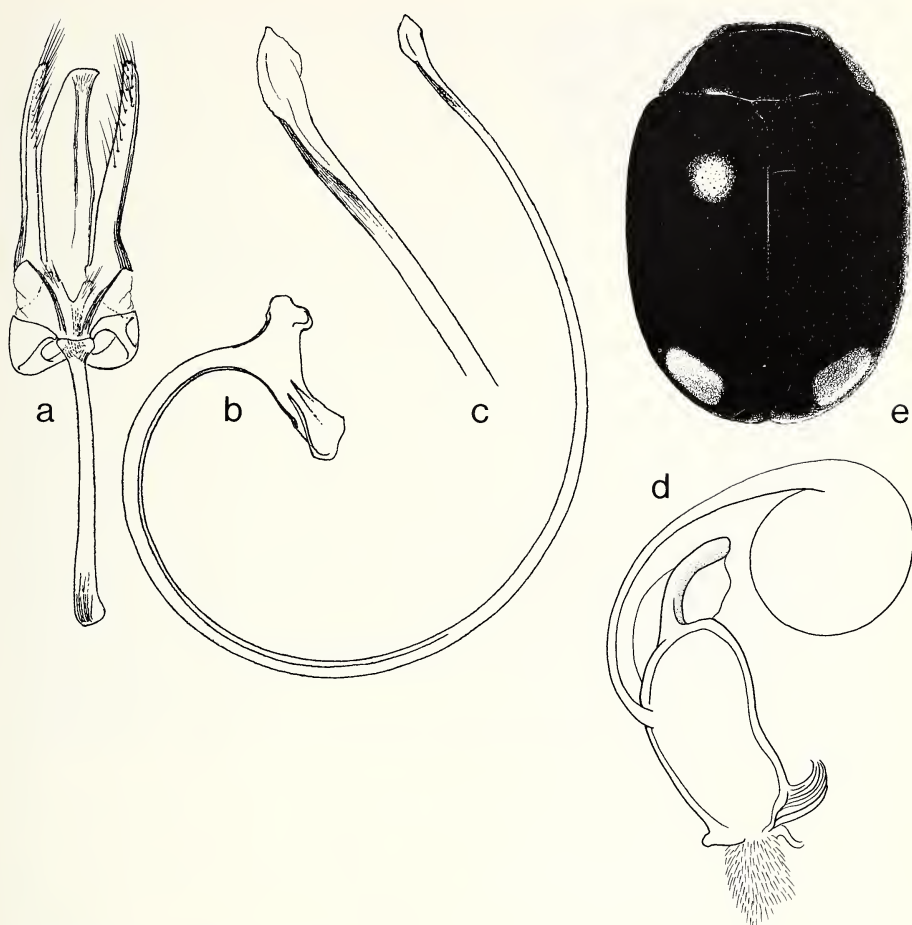


Fig. 423. *Hyperaspis postica*.

Type locality. Of *postica* (lectotype here designated) and *elliptica*, California; of *angustula*, Mendocino Co., California; of *essigi*, Yosemite, California.

Type depository. Of *postica*, MCZ; of *elliptica* (35195) and *angustula* (35194), USNM; of *essigi*, CAS.

Distribution. Figure 424. British Columbia to southern California. Peripheral localities: Medicine Hat, Alberta; Grand Canyon, Hualapai and Prescott, Arizona; Steamboat Springs, Colorado.



Fig. 424. Distribution. *Hyperaspis postica* (shaded, disjunct localities dotted); *H. simulatrix* (star).

Hyperaspis senegalensis hottentota Mulsant
Map, Fig. 424

Hyperaspis hottentota Mulsant, 1850, p. 686. — Crotch, 1874b, p. 236. — Korschefsky, 1931, p. 183.

Hyperaspis senegalensis hottentota: Fursch, 1972, p. 8.

Diagnosis. Length 3.40 to 3.90 mm, width 2.40 to 3.0 mm. Form rounded, somewhat oval, convex dorsoventrally. Male pronotum black with lateral $\frac{1}{3}$ yellow, apical margin yellow; elytron black with yellow apical spot. Postcoxal line reaching hind margin of first abdominal sternum, evenly curved throughout. Basal lobe of male genitalia with lateral projection in basal $\frac{1}{2}$.

Discussion. This African species has an elytral color pattern nearly identical to that of *H. postica*, however, the pronotum has the lateral $\frac{1}{3}$ yellow and the apical margin of the male yellow. In *postica* the pronotum is yellow in the lateral $\frac{1}{4}$ and the apical margin is black in both sexes. In addition, *H. hottentota* is nearly rounded in form and very convex, *H. postica* is elongate and comparatively flattened dorsoventrally. The color pattern of *H. hottentota* is most similar to that of *H. bigeminata* in the *bigeminata* group. Two species of scales attacking ice plant (a ground cover used for highway landscaping) in California precipitated a search for natural enemies. One of the resulting introductions was *H. hottentota* from South Africa, the species now "has only a tenuous foothold in northern California" (Tassan et al., 1982). To be specific, this means the San Francisco Bay area (K. Hagen, pers. comm.).

Type locality. Africa, Caffraria (lectotype designated by Fursch, 1972).

Type depository. NREA.

Distribution. Figure 424. CALIFORNIA: San Francisco Bay area.

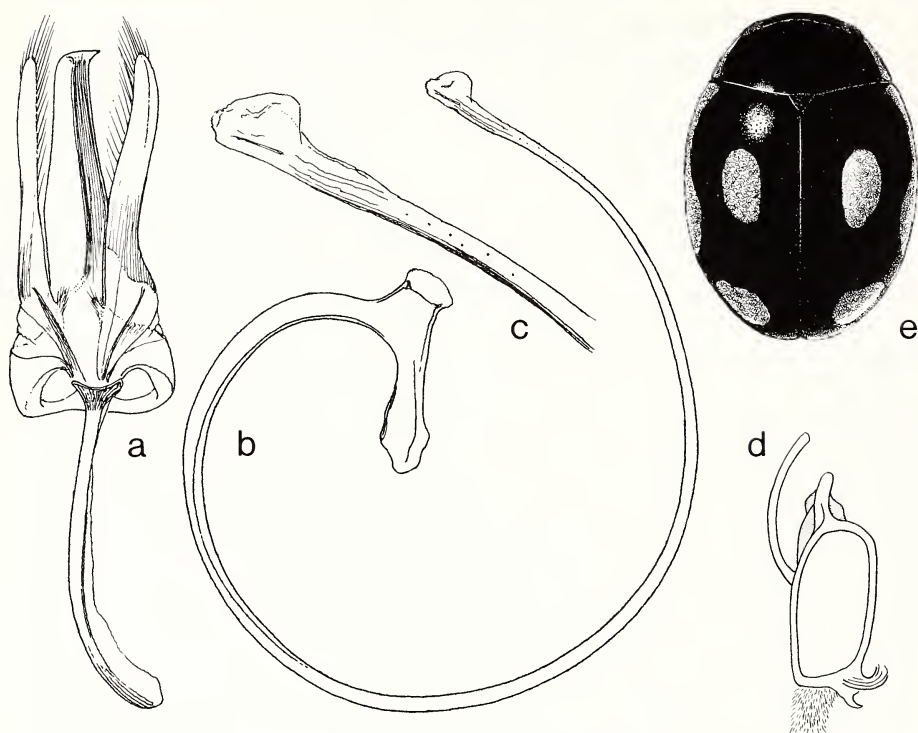


Fig. 425. *Hyperaspis simulatrix*.

Hyperaspis simulatrix Dobzhansky

Fig. 425a-e; Map, Fig. 424

Hyperaspis simulatrix Dobzhansky, 1941, p. 72.—Belicek, 1976, p. 315.

Diagnosis. Length 2.20 to 2.70 mm, width 1.60 to 1.85 mm. Form elongate, oval. Elytron with yellow marginal vitta from base to apical 3/5, apical spot transversely oval, discal spot elongate, angulate (Fig. 425e). Postcoxal line extending to hind margin of first abdominal sternum, flattened along margin, outer 1/3 angulate, area within line alutaceous, indistinctly punctured. Male genitalia as in Figure 425a-c. Female genitalia as in Figure 425d.

Discussion. The dorsal color pattern of *H. simulatrix* is similar to that of *H. quadrioculata* (*fidelis* form) and *H. spiculinata*, both of which have allopatric distributions. The male genitalia are practically identical to those of *H. postica*, but the female genitalia of the 2 species are distinctive for each, and *H. postica* never has a marginal vitta or an apical spot on the elytron.

Type locality. Oakley, Idaho.

Type depository. USNM (54216).

Distribution. Figure 424. OREGON: Harney Co., Tencent Lake. WASHINGTON: Smyrna.

Hyperaspis quadrioculata (Motschulsky)

Fig. 426a-f; Map, Fig. 427

Exochomus quadrioculatus Motschulsky, 1845b, p. 383.*Hyperaspis undulata* var. *4-oculata*: Crotch, 1873, p. 381.*Hyperaspis quadrioculata*: Crotch, 1874b, p. 231.—LeConte, 1880, p. 188.—Casey, 1899, p. 128.—Korschefsky, 1931, p. 194.*Hyperaspis quadrioculata quadrioculata*: Dobzhansky, 1941, p. 68.*Hyperaspis notatula* Casey, 1899, p. 121.—Casey, 1908, p. 413.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 193. **New Synonymy.***Hyperaspis quadrioculata notatula*: Dobzhansky, 1941, p. 69.*Hyperaspis fidelis* Casey, 1908, p. 418.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 188. **New Synonymy.***Hyperaspis quadrioculata scotti* Dobzhansky, 1941, p. 70. **New Synonymy.***Hyperaspis quadrioculata fidelis*: Dobzhansky, 1941, p. 70.

Diagnosis. Length 2.70 to 4.0 mm, width 1.50 to 2.25 mm. Form elongate, oval. Color pattern on elytron variable as in Figure 426d-f. Postcoxal line not reaching first abdominal sternum, evenly curved throughout, area within line alutaceous, indistinctly punctured. Male genitalia as in Figure 426a-c.

Discussion. The variable color pattern of this species has caused several names to be proposed, either as species, or subspecies of *H. quadrioculata*. The name *fidelis* Casey was proposed for the color pattern in Figure 426e, which intergrades with the pattern of *notatula* (Figure 426d) frequently and at so many localities that it is apparent that *fidelis* must be a junior synonym. The patterns of typical *quadrioculata* (Fig. 426f) and *notatula* do not intergrade as frequently nor at as many localities, but the distribution of both forms and their intergrades indicates that they cannot be maintained as subspecies, therefore *notatula* becomes a synonym of *quadrioculata*. The form called *quadrioculata scotti* by Dobzhansky I also regard as a junior synonym of *quadrioculata*. Most of the localities from which I have seen *scotti* are also localities where "*notatula*" occurs, and the *scotti* color pattern intergrades with that of *notatula* in most instances. There are also other unnamed color forms such as in a series from Fort Tejon, California, which has the typical "*notatula*" pattern except that the discal spot on the elytron is missing in most of the specimens, however, 3 of these specimens show distinct traces of the discal spot. A series from Mill Creek, San Bernardino Mts., has most examples lacking the humeral spot of "*notatula*", and were identified as *triangulum* Casey, but 4 examples have a small humeral spot present (this is the intermediate form discussed by El-Ali below). El-Ali (unpubl. dissertation) hybridized the forms discussed here and found that crosses attempted produced progeny. His results are excerpted as follows:

"1) the *quadrioculata* form had an F generation which were all *quadrioculata*-like with regard to elytral spots. In subsequent generations the same results were obtained.

2) the *scotti* form had an F generation which were all *scotti*-like in appearance. Most progeny had the humeral spot reduced or disappeared. Marginal and discal spots enlarged and merged together. Subsequent generations gave only this *scotti*-form.

3) the *notatula* form had an F generation of different elytral patterns: the largest

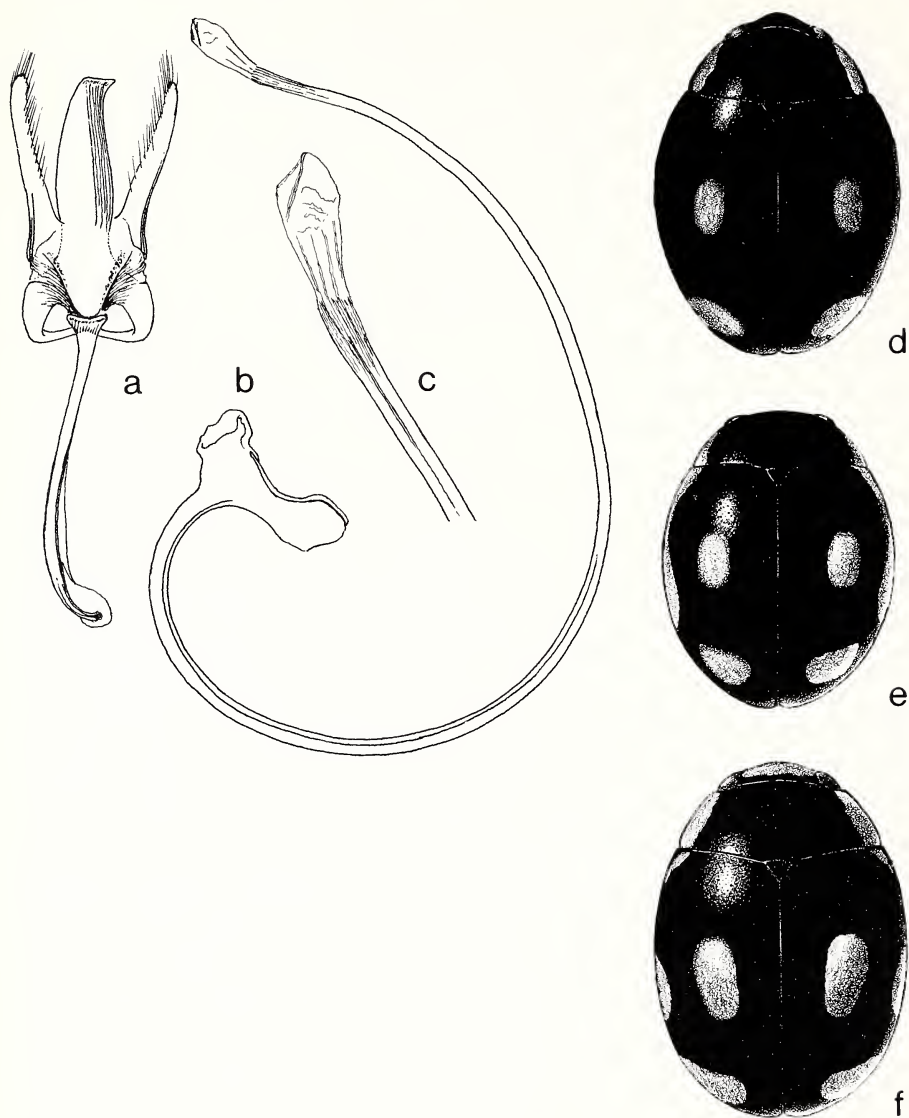


Fig. 426. *Hyperaspis quadrioculata*.

number of individuals and the *notatula*-like elytral pattern, followed by the individuals that had the intermediate form of elytral pattern, and a few individuals were like the *quadrioculata*-form. Some of the *notatula*-like forms and the intermediate forms had the discal and marginal spots large, but not connected. Selection of these types and crossing them manifested in their progeny a few individuals that were *scotti*-like and some individuals showed maculations of the previously mentioned forms of the F generation.

4) the intermediate form of the F generation produced individuals having the

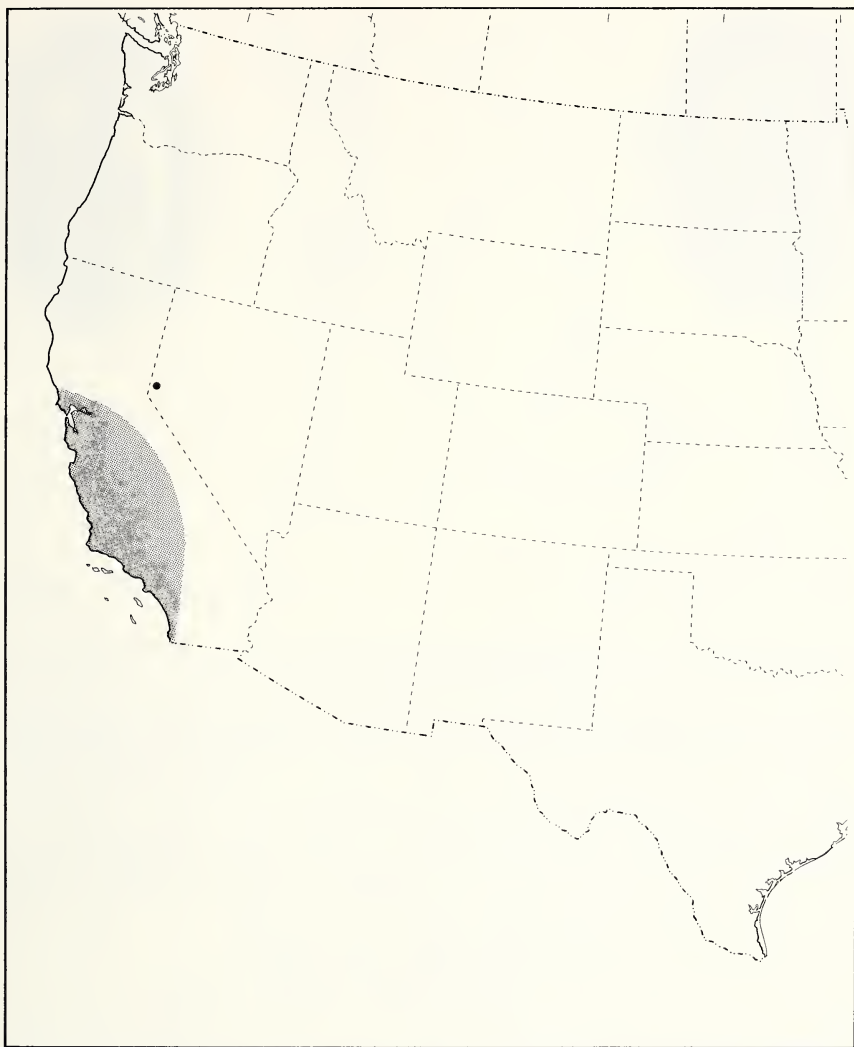


Fig. 427. Distribution. *Hyperaspis quadrioculata* (shaded, disjunct locality dotted).

patterns of *notatula*, *quadrioculata*, *scotti* and some of the intermediate elytral form. The *notatula* and the intermediate forms were the most numerous.”

The type specimens of *fidelis* (female) and *notatula* (male) are unique (holotypes) in the Casey collection. The type of *quadrioculata* has not been located.

Type locality. Of *quadrioculata*, type not examined; of *notatula*, Reno, Nevada; of *fidelis*, Los Angeles, California; of *scotti*, San Joaquin Co., California.

Type depository. Of *quadrioculata*, not located; of *notatula* (35209), and *fidelis* (35199), USNM; of *scotti*, CAS.

Distribution. Figure 427. CALIFORNIA: central and southern.

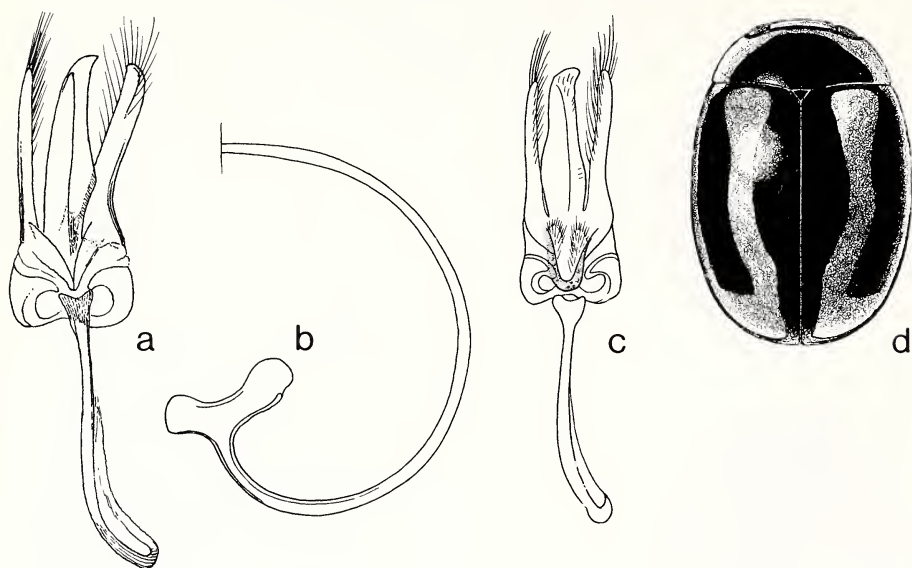


Fig. 428. *Hyperaspis annexa*.

Hyperaspis annexa LeConte

Fig. 428a-d; Map, Fig. 430

Hyperaspis annexa LeConte, 1852, p. 133.—LeConte, 1880, p. 188.—Crotch, 1873, p. 381.—Crotch, 1874b, p. 232.—Casey, 1899, p. 128.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 184.—Dobzhansky, 1941, p. 74. Wingo, 1952, p. 26.

Diagnosis. Length 2.0 to 2.75 mm, width 1.40 to 2.0 mm. Form elongate, oval, flattened dorsoventrally. Male pronotum usually widely yellow on anterior margin, but often narrowly yellow, occasional black. Elytron black with 2 yellow vittae on disc and lateral margin (Fig. 428d). Postcoxal line reaching hind margin of first abdominal sternum, flattened along margin, outer $\frac{1}{3}$ angulate, area within line alutaceous, indistinctly punctured. Male genitalia as in Figure 428a-c.

Discussion. The distinctive vittate appearance of most examples of *H. annexa* makes it one of the most easily recognized species of *Hyperaspis*. However, I suspect that *H. annexa* and *H. quadrioculata* may not be specifically different. The male genitalia of *H. annexa* are essentially identical to those of *H. quadrioculata*, and I have seen intergrading color patterns in 2 instances. The lectotype of *H. annexa* has the apical margin of the pronotum entirely black, the only instance of this observed, all other males having a distinct, usually broad, yellow apical margin. A series from Mill Creek, San Bernardino Mts., exhibits all degrees of intergradation of the elytral pattern from the *annexa* type to the *quadrioculata* type (*notatula* form). Thus far these are the only 2 obvious instances of apparent intergradation, therefore I prefer to consider *H. annexa* a valid species for the present, but point out the distinct possibility it may be synonymous with *H. quadrioculata*. *Hyperaspis annexa* was associated in a group with *H. quadrivitta* by Dobzhansky, however they have little in common except a vittate dorsal appearance. LeConte (1852) states that he had a

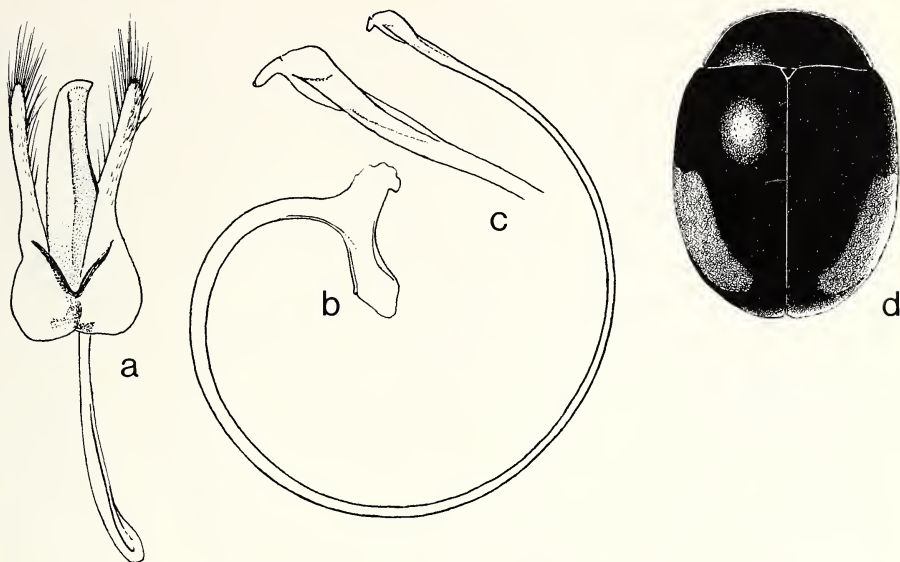


Fig. 429. *Hyperaspis arizonica*.

pair of types, and there are 2 specimens now in his collection. I here designate and label the male labeled "gold disc/male sign/Type 6718(red paper)H. annexa Lec." as the lectotype, and the female bearing only a gold disc as the paralectotype.

Type locality. San Francisco, California (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 430. CALIFORNIA: Cajon Pass; Compton; Fillmore; Kern Co., Tehachapi Pass; La Canada; Mt. Wilson; Paraiso Hot Springs; Pasadena; Riverside; San Bernardino; San Diego Co.; San Francisco Co.; San Mateo Co.; Santa Maria; Santa Paula; Tulare Co., Isabella.

Hyperaspis arizonica Dobzhansky

Fig. 429a–d; Map, Fig. 430

Hyperaspis biornata arizonica Dobzhansky, 1941, p. 53.

Diagnosis. Length 2.30 to 3.0 mm, width 1.70 to 2.20 mm. Form elongate, oval. Elytron black with large orange spot on outer margin in posterior $\frac{1}{2}$ (Fig. 429d). Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved throughout, area within line alutaceous, densely, coarsely punctured. Male genitalia as in Figure 429a–c.

Discussion. The single large spot occupying most of the posterior $\frac{1}{2}$ of an elytron makes *H. arizonica* an easily recognizable species. This species may resemble some color forms of *H. taeniata*, but females of the latter species have entirely black pronota.

Type locality. Bright Angel, Arizona (Grand Canyon Nat. Park).

Type depository. USNM (54211).

Distribution. Figure 430. ARIZONA: Bright Angel; South Rim Grand Canyon. CALIFORNIA: Bishop.

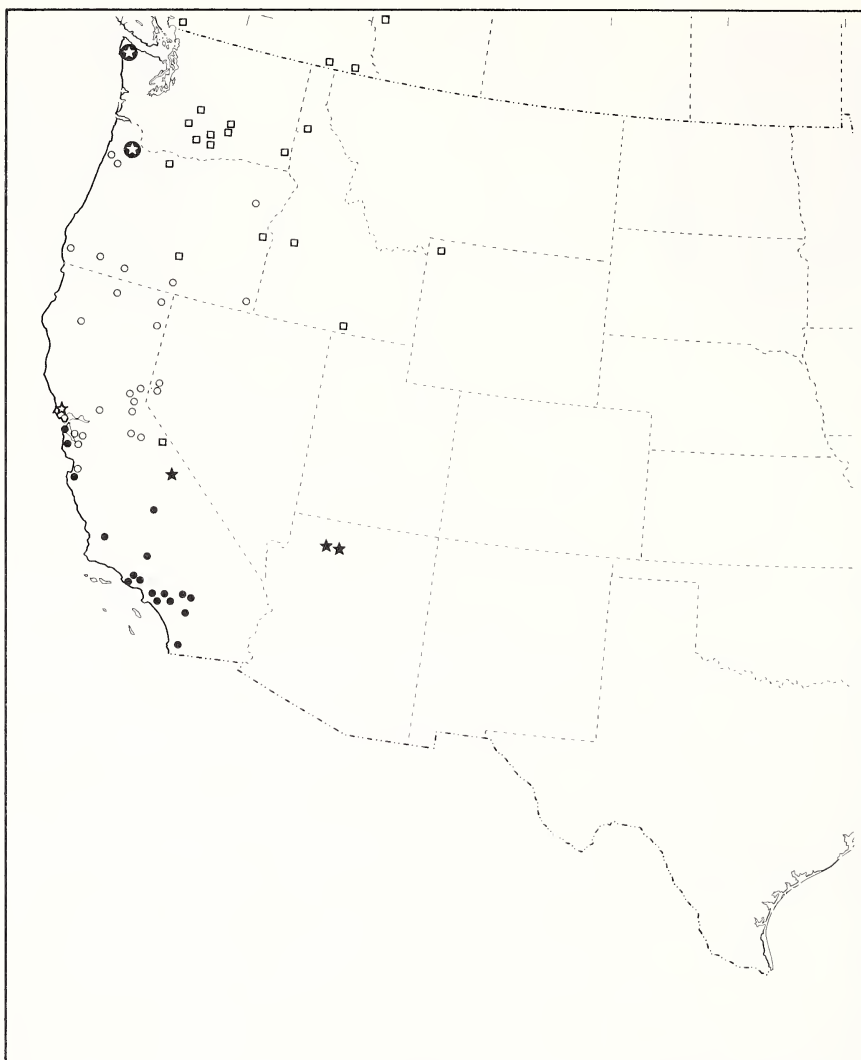


Fig. 430. Distribution. *Hyperaspis annexa* (dot); *H. arizonica* (star); *H. oculaticauda* (open circle); *H. oregona* (square); *H. immaculata* (circled star); *H. querquesi* (open star).

Hyperaspis oculaticauda Casey

Fig. 431a-d; Map, Fig. 430

Hyperaspis oculaticauda Casey, 1899, p. 127.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 193.—Dobzhansky, 1941, p. 41.—Hatch, 1961, p. 160.

Hyperaspis effeta Casey, 1899, p. 127.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 188.—Dobzhansky, 1941, p. 41.—Hatch, 1961, p. 160. **New Synonymy.**

Hyperaspis subdepressa Casey, 1899, p. 127.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 197.—Dobzhansky, 1941, p. 42. **New Synonymy.**

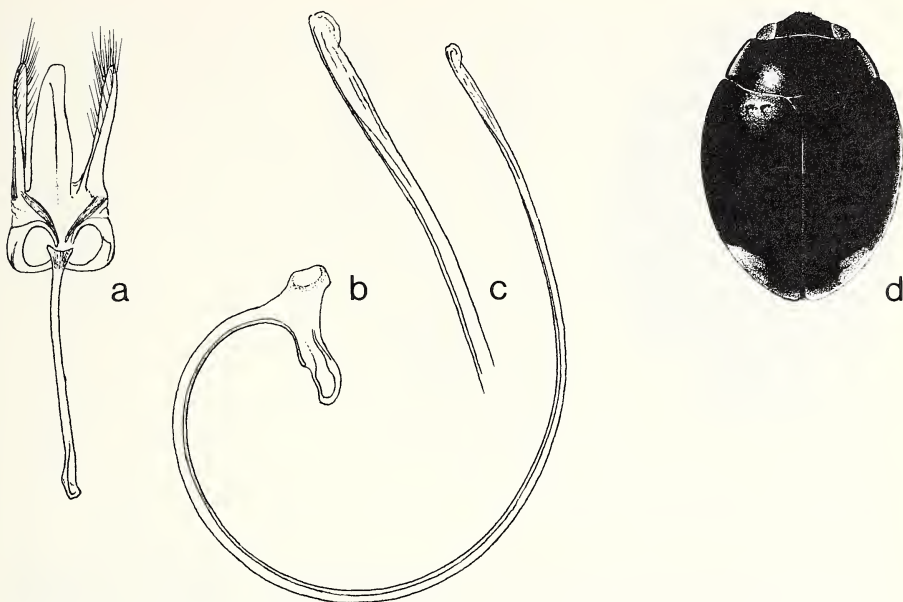


Fig. 431. *Hyperaspis oculaticauda*.

Diagnosis. Length 1.80 to 2.40 mm, width 1.40 to 1.80 mm. Form elongate, oval. Elytron black with single, apical spot (Fig. 431d). Postcoxal line as described for *H. postica*. Male genitalia as in Figure 431a-c.

Discussion. This species is a miniature edition of *H. postica*, having the same dorsal color pattern and same general type of male genitalia. It is much smaller than *H. postica*, the maximum observed length of *H. oculaticauda* being 2.40 mm, the minimum observed length of *H. postica* being 2.30 mm. The basal lobe of the male genitalia of *H. oculaticauda* is laterally emarginate in the apical $\frac{1}{2}$, the basal lobe in *H. postica* is emarginate in apical $\frac{2}{3}$ or $\frac{3}{4}$. *Hyperaspis effeta* Casey is a junior synonym of *H. oculaticauda*, the original description was based on a teneral male. I also regard *H. subdepressa* as a junior synonym of *H. oculaticauda* although the elytral punctation is slightly coarser than typical *H. oculaticauda*. The type series of *H. oculaticauda* is composed of a male and 4 females. I here designate and label the male as the lectotype, and the females as paralectotypes. The type of *H. effeta* (male) and the type of *H. subdepressa* (female) one uniques (holotypes).

Type locality. Of *oculaticauda*, Humboldt or Siskiyou Co., California (which county not stated) (lectotype here designated); of *effeta*, Placer Co., California, of *subdepressa*, Alameda Co., California.

Type depository. Of *oculaticauda* (35197), *effeta* (35191), and *subdepressa* (35190), USNM.

Distribution. Figure 430. CALIFORNIA: Alameda Co., Livermore, Bay Farm Is.; Cisco; Eldorado Co., Eldorado; Lassen Co., Hallelujah Junction; Modoc Co., Lake City; Marin Co., Lagunitas; Monterey Co., Carmel; Nevada Co., Boca; Pleasanton; Sacramento; Shasta Springs; Sierra Co., Sierraville; Trinity Co., Carrville; Tuolumne

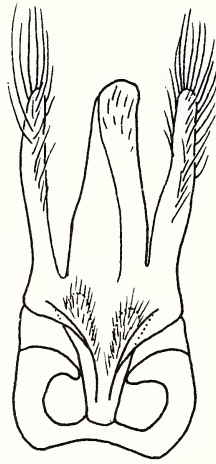


Fig. 432. *Hyperaspis immaculata*.

Co., Chipmunk Flat, Strawberry; Yreka. NEVADA: Reno; Washoe Co., Pyramid. OREGON: Baker Creek; Curry Co., Cape Sebastian St. Pk.; Jackson Co., Siskiyou Summit; Klamath Falls; Geary Ranch; Lakeview; McMinnville; Woods.

Hyperaspis immaculata Hatch

Fig. 432; Map, Fig.430

Hyperaspis immaculata Hatch, 1961, p. 161.

Diagnosis. Length 2.0 mm. Form elongate, oval. Elytron entirely black. Pronotum narrowly yellow in both sexes. Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved throughout, area within line alutaceous, impunctate or with fine, nearly imperceptible punctures. Male genitalia as in Figure 432 (siphon lost).

Discussion. The only species with entirely black elytra with which *H. immaculata* could be confused is *H. pleuralis* which is not known to occur in western Washington and Oregon where *H. immaculata* is found. In addition, the body form of *H. pleuralis* is more rounded and convex than that of *H. immaculata*.

Type locality. Olympic Hot Springs, Washington.

Type depository. USNM.

Distribution. Figure 430. OREGON: Alston Mt.; McMinnville.

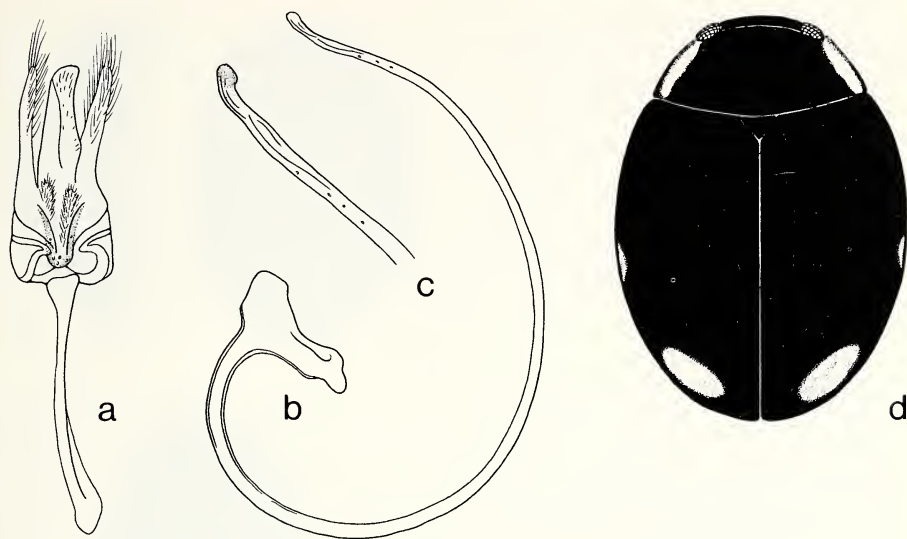


Fig. 433. *Hyperaspis querquesi*.

Hyperaspis querquesi Nutting

Fig. 433a-d; Map, Fig. 430

Hyperaspis querquesi Nutting, 1980, p. 263.

Diagnosis. Length 2.55 to 2.70 mm, width 1.60 to 2.0 mm. Form elongate, oval. Elytron black with large, apical yellow spot and small lateral spot on margin behind middle (Fig. 433d). Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved throughout, area within line alutaceous, impunctate or with fine, nearly imperceptible punctures. Male genitalia as in Figure 433a-c.

Discussion. The elytral color pattern is like that of *H. postica* except for the small lateral spot, and like that of the form of *H. quadrioculata* having the lateral spot except for the presence of a discal spot. The male genitalia of *H. querquesi* are unlike either of these species because the lateral emargination of the basal lobe is in the apical 1/2, as in *H. oculaticauda*.

Type locality. Bird Observation Station, Marin Co., California.

Type depository. CAS.

Distribution. Figure 430. CALIFORNIA: Mendocino Co., Inglenook Fen.

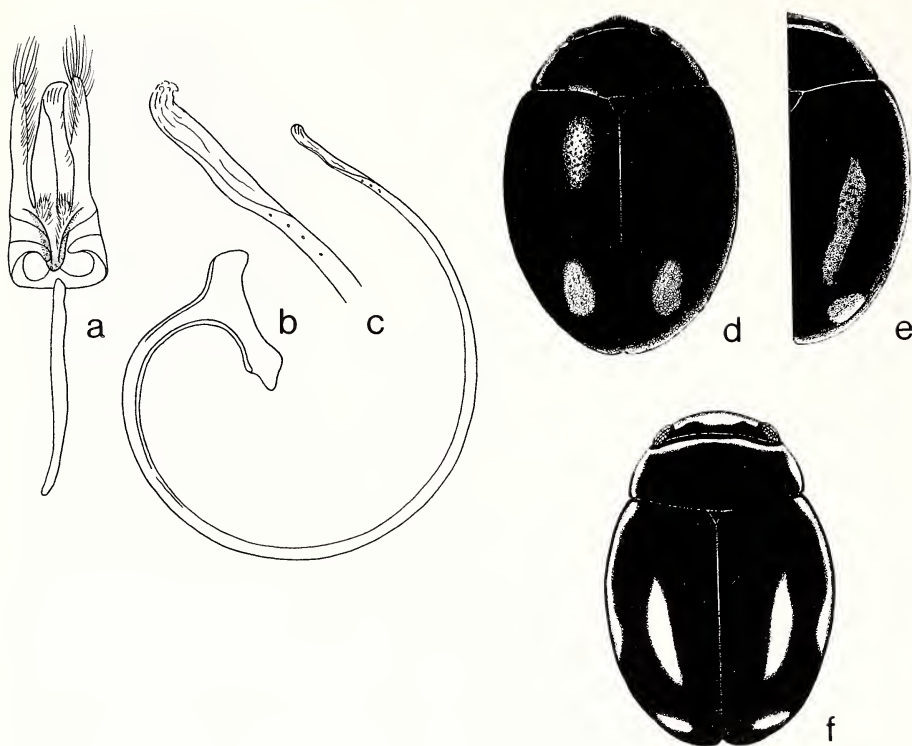


Fig. 434. *Hyperaspis oregona*.

Hyperaspis oregona Dobzhansky

Fig. 434a-f; Map, Fig. 430

Hyperaspis oregona Dobzhansky, 1941, p. 76. — Hatch, 1961, p. 157. — Belicek, 1976, p. 314.

Hyperaspis lanei Hatch, 1961, p. 159. **New Synonymy.**

Diagnosis. Length 2.0 to 2.60 mm, width 1.50 to 1.78 mm. Form elongate, oval. Elytron black with oblique discal vitta, transverse apical spot, and narrow marginal vitta extending from base to apical $\frac{3}{4}$ (Fig. 434f), maculation often reduced to remnant of discal vitta or loss of discal vitta (Fig. 434d, e). Postcoxal line not reaching hind margin of first abdominal sternum, flattened along hind margin, outer $\frac{1}{3}$ angulate, area within line alutaceous, feebly punctured. Male genitalia as in Fig. 434a-c.

Discussion. Typical examples of this species resemble examples of *H. quadrivittata*, from which *H. oregona* differs in having the elytral vittae not approaching the elytral base, and the marginal vittae not reaching the apical spots. *Hyperaspis lanei* Hatch has male genitalia nearly identical to those of *oregona* and I consider *lanei* a color variant of *H. oregona*, therefore a junior synonym. The tendency toward the disappearance of the discal vittae in any long series of typical *H. oregona* is apparent,

and the complete loss of these vittae would result in the form described as *lanei* (Fig. 434d). *Hyperaspis oregona* has previously been placed in a group with *H. quadrivittata*, but the male genitalia indicate that *H. oregona* belongs in the *postica* group.

Type locality. Of *oregona*, Harney Co., Oregon; of *lanei*, Bead Lake, Washington.

Type depository. Of *oregona*, CAS; of *lanei*, USNM.

Distribution. Figure 430. ALBERTA: Banff. BRITISH COLUMBIA: Creston; Fernie; Royal Oak. CALIFORNIA: Mono Co., Bridgeport; Siskiyou Co., Bartle. IDAHO: Cassia Co., Rock Creek Can.; Centerville; Hayden's L. OREGON: Blue Mts.; Cottonwood Creek; Harper. WASHINGTON: Ellensburg; Yakima R. Canyon; Entiat; Granger; Moxee; Neppel; Pullman; Soap Lake; Wenatchee. WYOMING: "Nat. Park."

disconotata group

Female pronotum entirely black; form rounded, convex; base of first abdominal sternum within postcoxal line depressed, with transverse suture; male genitalia of the *undulata* type without bisinuate lateral margin of basal lobe.

The affinities of the 2 species included in this group appear to be with members of the *undulata* group, but the female pronotum is entirely black and the basal lobe of the male genitalia is not bisinuate, therefore I do not include them in the *undulata* group.

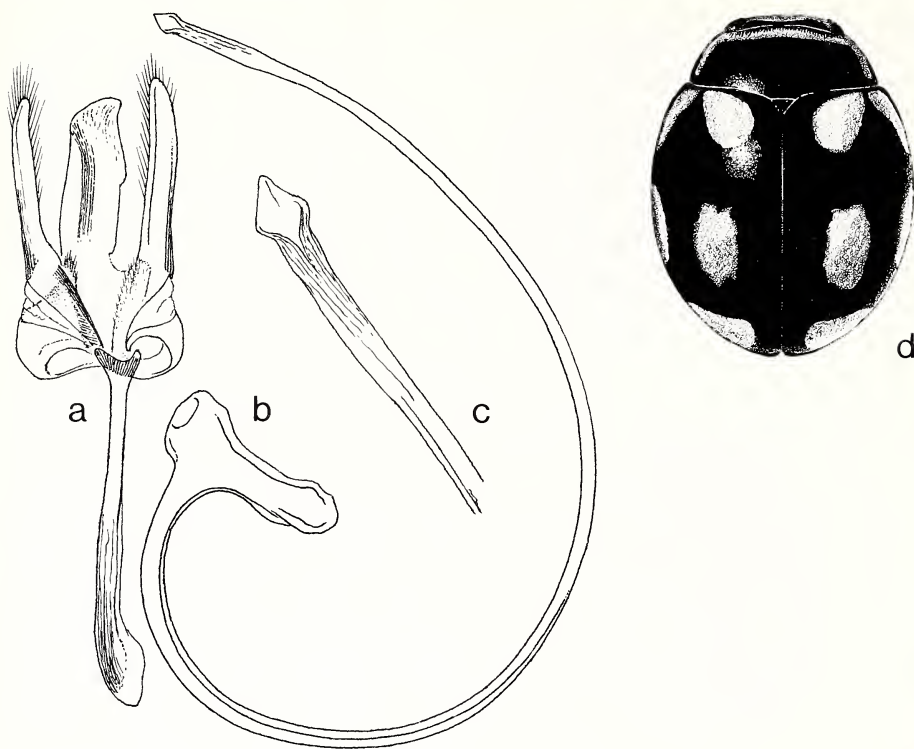


Fig. 435. *Hyperaspis disconotata*.

Hyperaspis disconotata Mulsant

Fig. 435a-d; Map, Fig. 436

Hyperaspis disconotata Mulsant, 1850, p. 653.—Crotch, 1873, p. 380.—LeConte, 1880, p. 187.—Casey, 1899, p. 127.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 187.—Wingo, 1952, p. 26.

Hyperaspis disconotata disconotata: Dobzhansky, 1941, p. 61.

Diagnosis. Length 2.30 to 2.80 mm, width 1.75 to 2.0 mm. Form elongate, oval, moderately convex. Elytron with 5 yellow spots (Fig. 435d), median basal spot oblique and close to humeral spot. Postcoxal line distinctly removed from hind margin of first abdominal sternum, slightly flattened parallel to hind margin, area within line dull, strongly alutaceous, barely perceptibly punctured. Male genitalia as in Figure 435a-c.

Discussion. This species and *H. troglodytes* have been variously considered as synonyms or varieties of each other by authors. Dobzhansky (1941) considered *H. troglodytes* to be a subspecies of *H. disconotata* based on a presumed difference in distribution. I have seen both *H. disconotata* and *H. troglodytes* from the same locality, Sherborn, Massachusetts. *Hyperaspis disconotata* is elongate, moderately convex in form, the pronotal punctures are very fine, indistinct in some specimens,

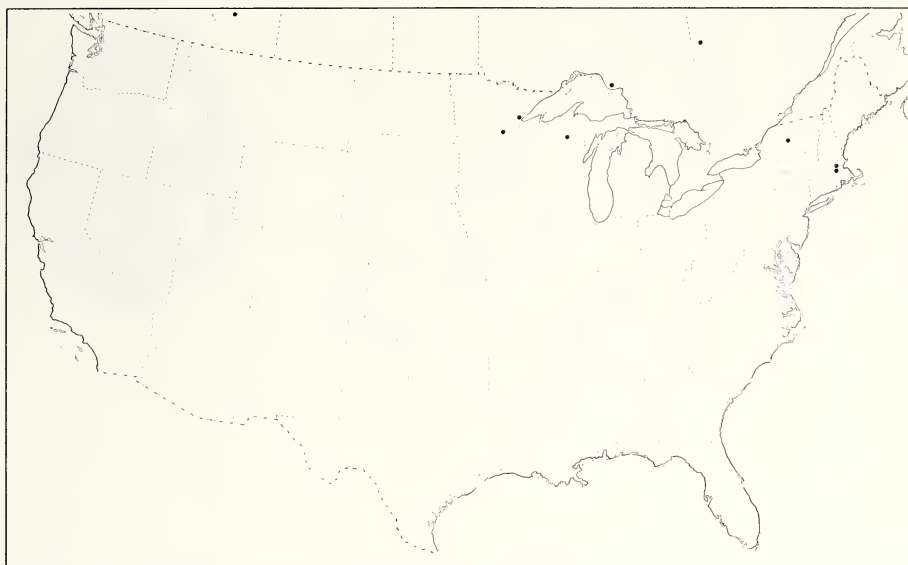


Fig.. 436. Distribution. *Hyperaspis disconotata*.

and the 2 basal spots on each elytron almost touch. *Hyperaspis troglodytes* is rounded, convex in form, the pronotal punctures are distinct, and the 2 basal spots on each elytron do not approach each other. For these reasons I consider both species valid. There are 2 female types in the LeConte collection, one of which, labeled "(pale blue disc, clipped)/4660/H. disconotata Muls.", I here designate and label as the lectotype. The other specimen bearing only a pale blue, clipped disc, I designate a paralectotype.

Type locality. Lake Superior (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 436. ALBERTA: Edmonton. QUEBEC: Duparquet. MASSACHUSETTS: Northboro; Sherborn. MINNESOTA: Duluth; Garrison. NEW YORK: Mt. Marcy. WISCONSIN: Oneida Co.

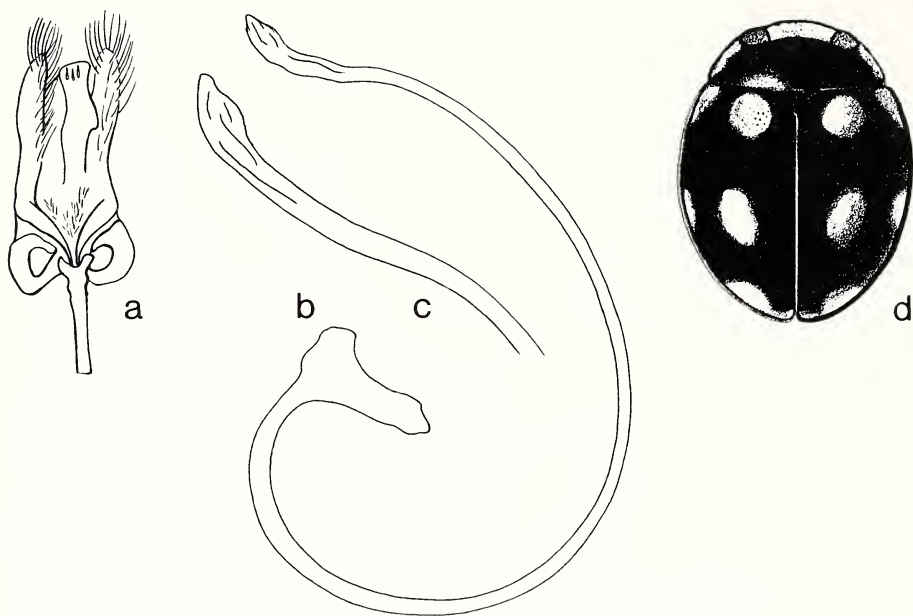


Fig. 437. *Hyperaspis troglodytes*.

Hyperaspis troglodytes Mulsant

Fig. 437a-d; Map, Fig. 438

Hyperaspis troglodytes Mulsant, 1853, p. 91.—Casey, 1899, p. 127.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 198.

Hyperaspis disconotata troglodytes: Dobzhansky, 1941, p. 62.

Hyperaspis discreta LeConte, 1880, p. 187.—Casey, 1899, p. 127.

Hyperaspis troglodytes ab. *discreta*: Korschefsky, 1931, p. 198.

Hyperaspis novascotiae Chapin, 1955, p. 153. **New Synonymy.**

Diagnosis. Length 2.0 to 2.75 mm, width 1.60 to 2.40 mm. Form rounded, convex. Color pattern of elytron as described for *H. disconotata* except basal spots on elytron widely separated (Fig. 437d). Postcoxal line as described for *H. disconotata*. Male genitalia as in Figure 437a-c.

Discussion. The external differences between *H. troglodytes* and *H. disconotata* have been discussed under the latter species. In addition, the male genitalia are distinct in each case. I have not located a type of *H. troglodytes*. The type of *H. discreta* is a unique (holotype) male labeled "Cambr. 20.2.74/Type 6710 (red paper)/*H. discreta* LeC." The male holotype of *novascotiae* lacks the median basal spot and the genitalia are slightly different than those of *troglodytes*, but I regard it as synonymous with *troglodytes*. *Hyperaspis troglodytes* is so rare in collections that the possible range of variation cannot be assessed.

Type locality. Of *troglodytes*, United States; of *discreta*, Cambridge, Massachusetts; of *novascotiae*, Bridgewater, Crescent Beach, Nova Scotia.

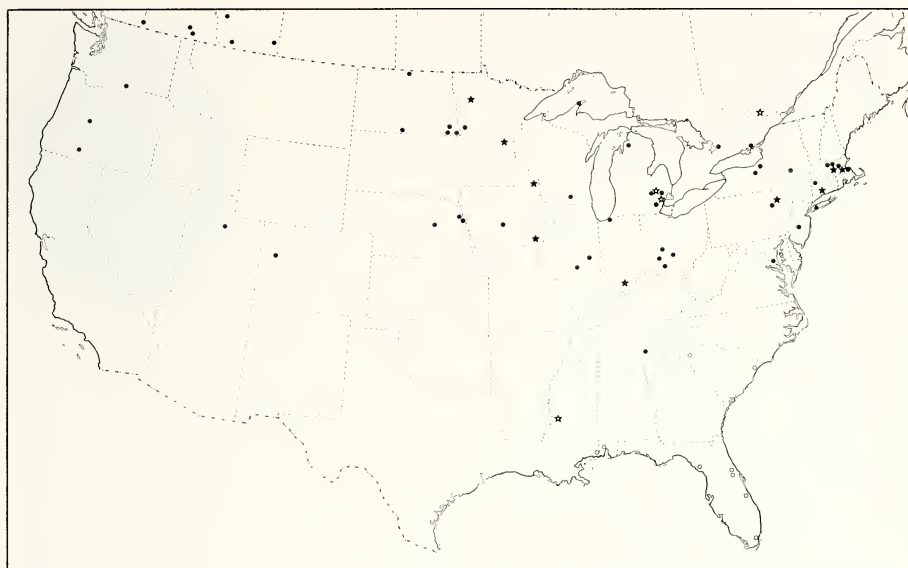


Fig. 438. Distribution. *Hyperaspis troglodytes* (star); *H. undulata* (dot); *H. octavia* (open star); *H. paludicola* (open circle).

Type depository. Of *troglodytes*, type not located; of *discreta*, MCZ; of *novascotiae*, CNC.

Distribution. Figure 438. CONNECTICUT: New Haven. INDIANA: Orange Co. IOWA: Mt. Pleasant. MASSACHUSETTS: Berlin; Framingham; Sherborn. MINNESOTA: Fillmore Co.; Houston Co.; Mille Lacs Co.; Plummer. PENNSYLVANIA: Mt. Alta.

undulata group

Female pronotum narrowly yellow on lateral border; form elongate or rounded; male genitalia with basal lobe bisinuate on lateral margin.

The bisinuate basal lobe of the male genitalia is the striking characteristic of this group. The body form is generally elongate, sometimes depressed, in general more convex than in members of the *quadrivittata* group.

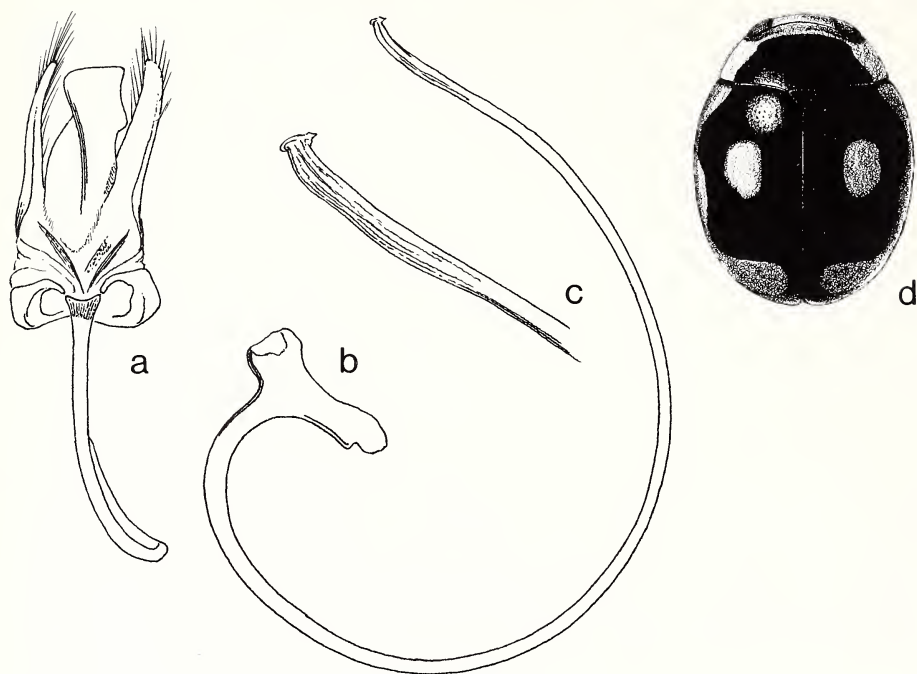


Fig. 439. *Hyperaspis undulata*.

Hyperaspis undulata (Say)

Fig. 439a-d; Map, Fig. 438

Coccinella undulata Say, 1824, p. 92.—Mulsant, 1850, p. 1049.

Hyperaspis undulata: Crotch, 1873, p. 381.—Wickham, 1894, p. 304.—Weise, 1895a, p. 128.—Casey, 1899, p. 128.—Blatchley, 1910, p. 521.—Korschefsky, 1931, p. 198.—Dobzhansky, 1941, p. 65.—Wingo, 1952, p. 26.—J. Chapin, 1974, p. 43.—Belicek, 1976, p. 314.

Hyperaspis maculifera Melsheimer, 1847, p. 179.—LeConte, 1880, p. 189.

Hyperaspis elegans Mulsant, 1850, p. 658.—LeConte, 1852, p. 134.—LeConte, 1880, p. 187.

Hyperaspis elegans var. *guttifera* Weise, 1895a, p. 128.

Hyperaspis undulata ab. *guttifera*: Korschefsky, 1931, p. 199.

Diagnosis. Length 1.80 to 2.75 mm, width 1.50 to 2.0 mm. Form elongate, oval, moderately convex. Elytron black with complete, irregular, lateral vitta (Fig. 439d), or with vitta broken to form apical spot. Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved throughout. Male genitalia as in Figure 439a-c.

Discussion. With the exception of *H. octavia*, *H. undulata* is readily recognized by the dorsal color pattern over most of the area in which it occurs. There is no good

external character that will distinguish *H. undulata* from *H. octavia*, but *H. octavia* is usually larger, the body form less elongate, and the surface of the pronotum less strongly alutaceous than in *H. undulata*. The type of *undulata* no longer exists and the type of *maculifera* could not be located. The type of *elegans* Mulsant is a female labeled "Amer. bor., LeConte" which I designate and label as the lectotype.

Type locality. Of *undulata*, "Missouri"; of *maculifera*, Pennsylvania; of *elegans*, "l'Amerique boreale"; of *guttifera*, not stated.

Type depository. Of *undulata*, type lost; of *maculifera*, type not located; of *elegans*, DLM; of *guttifera*, not located.

Distribution. Figure 438. ALBERTA: Calgary; Coaldale; Medicine Hat. BRITISH COLUMBIA: Creston; Lulu Is; Sumas; Summerland; Wynnndel. ONTARIO: Muskoka Co., Gull Lake; Pr. Edw. Co. CONNECTICUT: Lakeville. COLORADO: Eckert. ILLINOIS: Macon Co.; Urbana. INDIANA: Dunes Park Beach. IOWA: Ames. KANSAS: Atchison; Manhattan; Mission. LOUISIANA: Cameron Parish; Orleans Parish; Webster Parish. MARYLAND: Upper Marlboro. MASSACHUSETTS: Ashburnhas; Framingham; Natick; Northboro. MICHIGAN: Birmingham; Charlevoix Co.; Keweenaw Co.; East Lansing; Rochester; Royal Oak; Washtenaw Co. MINNESOTA: Clay Co., Buffalo River. NEW JERSEY: Haddon Hts. NEW YORK: Geneva; Long Beach; Onondaga Co.; Seneca Co., Willard. NORTH DAKOTA: Billings Co.; Bottineau Co.; Grant Co., Lake Tschida; Lake Tewaukon; Richland Co., Mirror Pool; Wahpeton. OHIO: Champaign Co.; Green Co., John Bryan St. Pk.; Highland Co., Rocky Ford L; Licking Co. OREGON: Klamath Falls; Redmond. PENNSYLVANIA: Mt. Alta. TENNESSEE: Chattanooga. UTAH: Provo. WASHINGTON: Benton Co., Hanford Works. WISCONSIN: Dane Co., Madison.

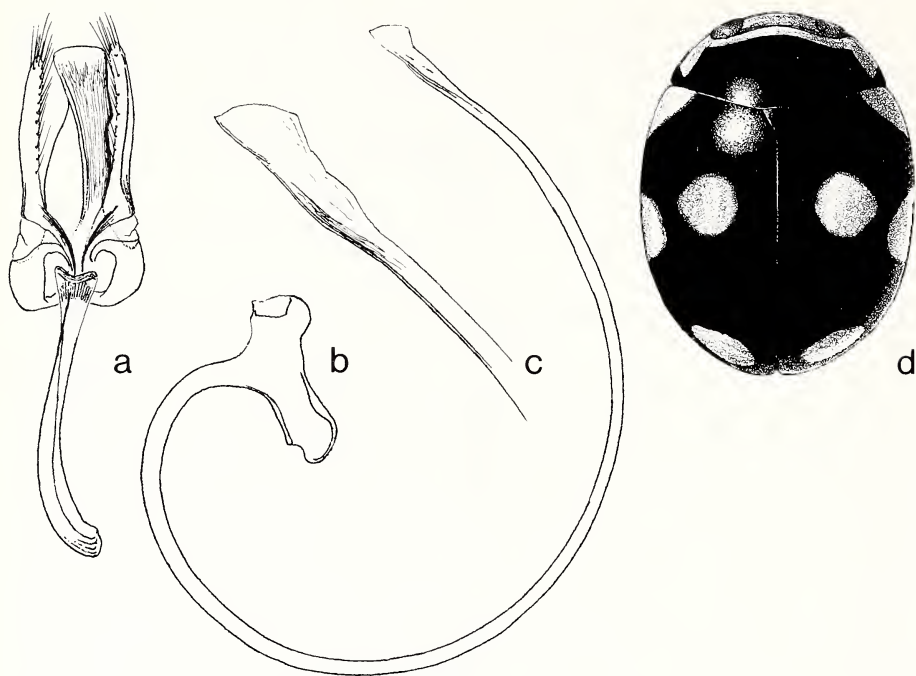


Fig. 440. *Hyperaspis octavia*.

Hyperaspis octavia Casey
Fig. 440a-d; Map, Fig. 438

Hyperaspis octavia Casey, 1908, p. 419.—Korschefsky, 1931, p. 193.—Dobzhansky, 1941, p. 65.—Wingo, 1952, p. 26.

Diagnosis. Length 2.20 to 2.80 mm, width 1.70 to 2.10 mm. Form broadly oval, convex. Elytron black with pattern variable from that described for *H. undulata* to having the lateral vitta broken into 3 spots (Fig. 440d). Postcoxal line as described for *H. undulata*. Male genitalia as in Figure 440a-c.

Discussion. This species will normally be confused only with *H. undulata* (see comments under *H. undulata*). There are 3 types of *H. octavia* in the Casey collection, one male and 2 females. I here designate and label the male as the lectotype, the females as paralectotypes.

Type locality. Vicksburg, Mississippi (lectotype here designated).

Type depository. USNM (35204).

Distribution. Figure 438. QUEBEC: St. Hilaire. MICHIGAN: Detroit; Oakland Co.

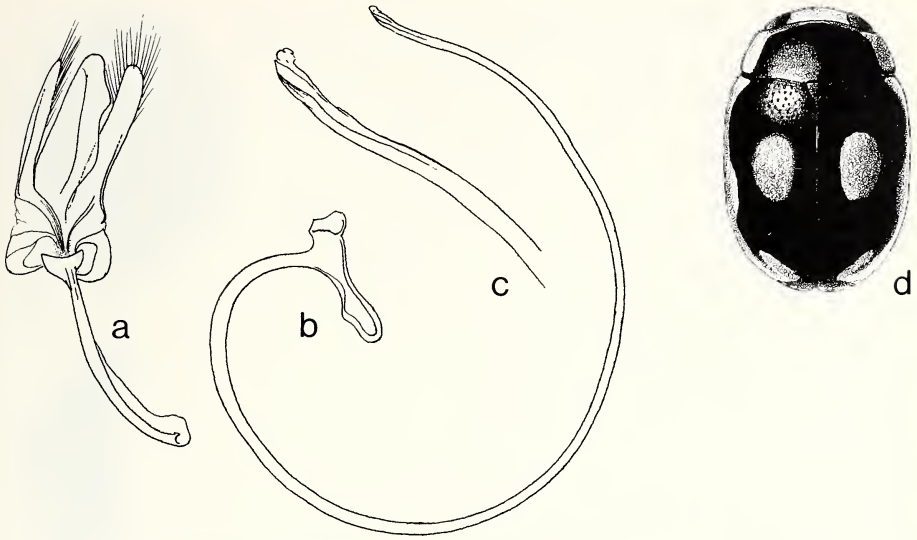


Fig. 441. *Hyperaspis paludicola*.

Hyperaspis paludicola Schwarz

Fig. 441a-d; Map, Fig. 438

Hyperaspis paludicola Schwarz, 1878, p. 362.—LeConte, 1880, p. 188.—Casey, 1899, p. 128.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 193.—Dobzhansky, 1941, p. 66.

Diagnosis. Length 1.70 to 2.10 mm, width 1.10 to 1.40 mm. Form elongate, nearly parallel sided, depressed. Elytron black with narrow, complete lateral vitta and one discal spot (Fig. 441d). Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved throughout, area within line alutaceous, barely perceptibly punctured. Male genitalia as in Figure 441a-c.

Discussion. The dorsal color pattern is identical to that of typical *H. undulata*, but the parallel sided depressed form of *H. paludicola* is quite different from the oval, moderately convex appearance of *H. undulata*. These 2 species are apparently allopatric. I have seen 5 type specimens of *paludicola* labeled "Type", of these I select and label a male labeled "Capron Fla. 3.4/Coll Hubbard & Schwarz/Type No. 4519 U.S.N.M." as the lectotype. The other 4 specimens from Capron and Lake Ashby I designate as paralectotypes.

Type locality. Capron, Florida (lectotype here designated).

Type depository. USNM (4519).

Distribution. Figure 438. ALBERTA: Mobile. FLORIDA: Kissimmee; Sanford; Steinhatchee R. GEORGIA: Dade Co., Grant's Blowing Spring. MISSISSIPPI: Pascagula. SOUTH CAROLINA: Myrtle Beach; Sassafras Mtn.

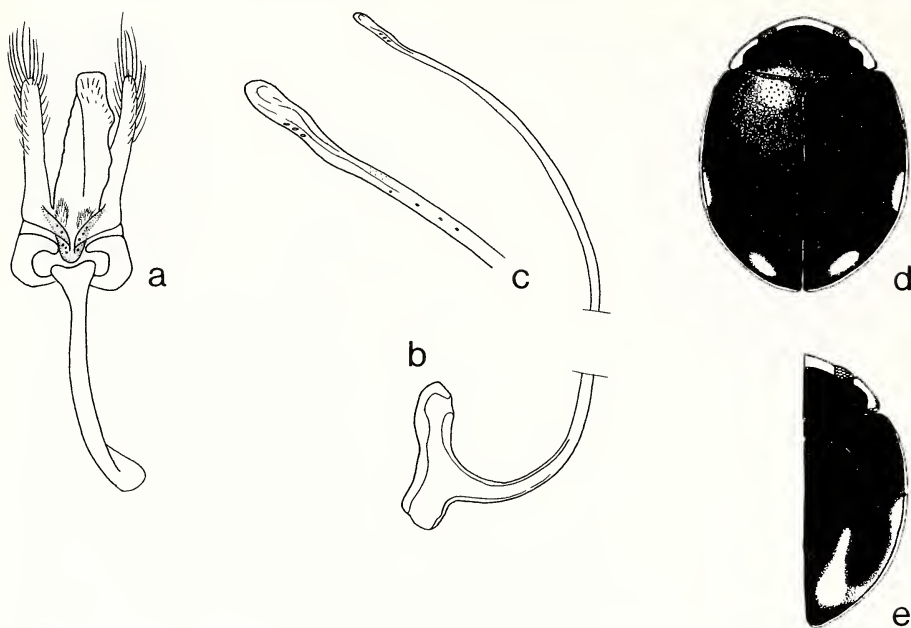


Fig. 442. *Hyperaspis borealis*.

Hyperaspis borealis Dobzhansky

Fig. 442a-e; Map, Fig. 444

Hyperaspis oregona borealis Dobzhansky, 1941, p. 76.

Hyperaspis oregona: Belicek, 1976, p. 314.

Hyperaspis borealis: Hatch, 1961, p. 76.

Hyperaspis obscura Malkin, 1943a, p. 110.—Hatch, 1961, p. 159. **New Synonymy.**

Hyperaspis simuloides Hatch, 1961, p. 159. **New Synonymy.**

Hyperaspis schuhi Hatch, 1961, p. 160. **New Synonymy.**

Hyperaspis elali Nutting, 1980, p. 262. **New Synonymy.**

Diagnosis. Length 2.10 to 3.0 mm, width 1.50 to 2.0 mm. Form elongate, somewhat oval. Elytron black with discal and lateral vittae joined at apex (Fig. 442d), pattern variable as in Figure 442d, e. Postcoxal line nearly reaching hind margin of first abdominal sternum, flattened along margin, area within line alutaceous, distinctly punctured. Male genitalia as in Figure 442a-c.

Discussion. The fully marked form resembles *H. quadrivittata* and *H. oregona* but so many color variants occur in this species that male genitalia are the only positive criteria for recognizing *H. borealis*. Dobzhansky (1941) described *borealis* as a sub-species of *oregona*, but *H. borealis* belongs in the *undulata* group while *H. oregona* is in the *postica* group. The names I place in synonymy are all color variants of *H. borealis*, and the male genitalia form the basis of this synonymy.

Type locality. Of *borealis*, Lake Cle-Elum, Washington; of *obscura*, Lake of the Woods, Klamath Co., Oregon; of *simuloides*, Almota, Washington; of *schuhi*, Sprague

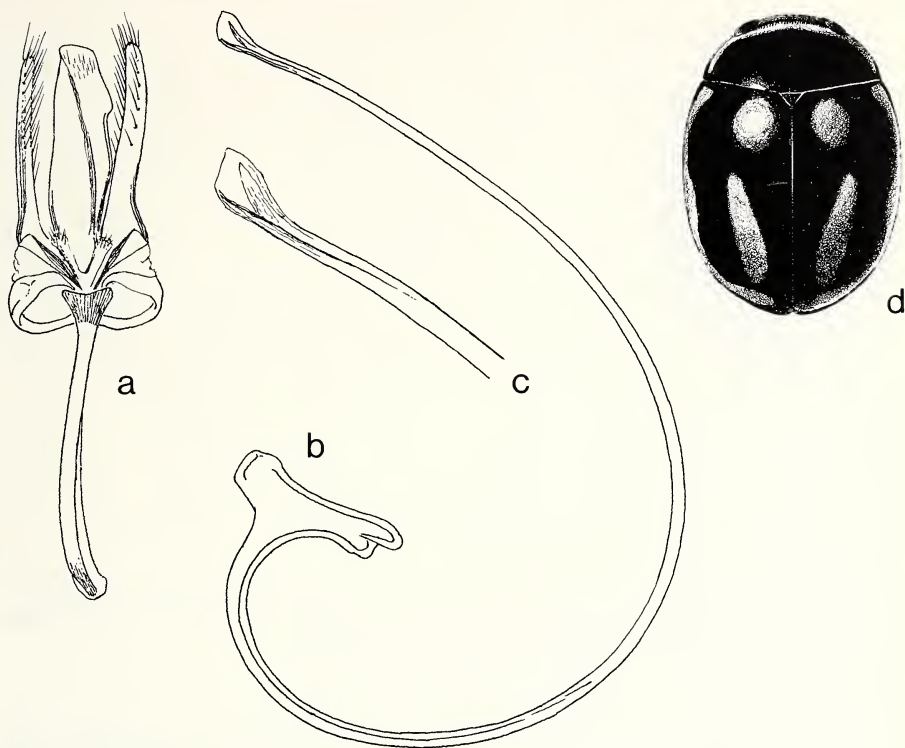


Fig. 443. *Hyperaspis consimilis*.

River, 5 mi. E. Bly, Oregon; of *elali*, Yosemite National Park, Tuolumne Co., California.

Type depository. Of *borealis*, *obscura*, and *elali*, CAS; of *simuloides* and *schuhi*, USNM.

Distribution. Figure 444. BRITISH COLUMBIA: Vancouver; Yale. CALIFORNIA: Alameda Co., Hayward; Trinity Co., Trinity River; Tuolumne Co., Yosemite Nat. Park. OREGON: Corvallis; Harper; Klamath Falls; McMinnville. WASHINGTON: Coupeville; Sunnyside; Fidalgo I; King Co., Seattle; Kittitas; North Bend; Thurston Co., Offut L.; Olympia; Olympic N. F., Hurricane Rdge; Port Angeles; Pullman; Puyallup; Seaview; Skagit Co., Clear L.; Snohomish Co., Chase L.; Sultan.

Hyperaspis consimilis LeConte

Fig. 443a-d; Map, Fig. 444

Oxynchus consimilis LeConte, 1852, p. 134.—Korschefsky, 1931, p. 202.

Hyperaspis consimilis: Crotch, 1873, p. 381.—Crotch, 1874b, p. 233.—LeConte, 1880, p. 189.—Casey, 1899, p. 128.—Dobzhansky, 1941, p. 78.

Hyperaspis disconotata canadensis Dobzhansky, 1941, p. 63. **New Synonymy.**

Hyperaspis moerens: Wingo, 1952, p. 26.

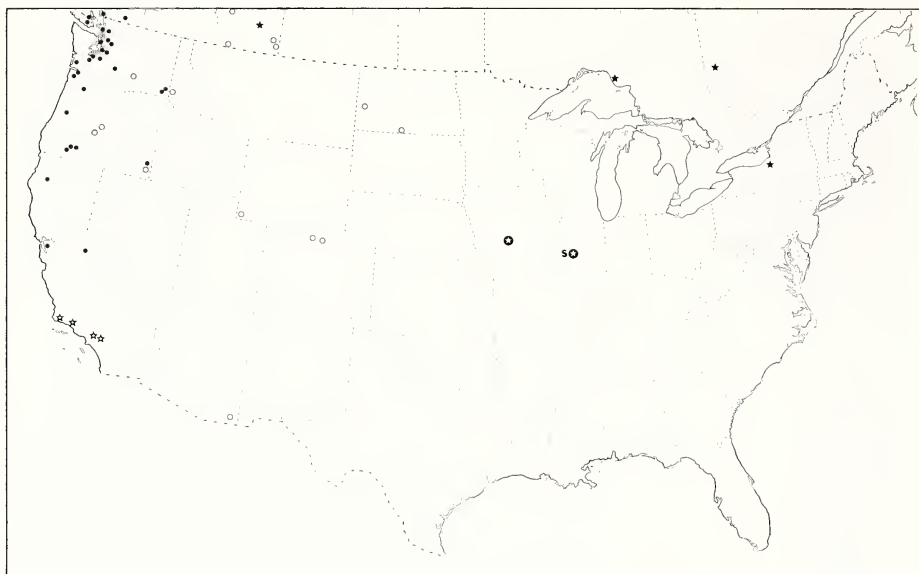


Fig. 444. Distribution. *Hyperaspis borealis* (dot); *H. consimilis* (star); *H. spiculinota* (open star); *H. quadrivittata* (open circle); *H. brunnescens* (circled star).

Diagnosis. Length 2.30 to 2.70 mm, width 1.70 to 1.90 mm. Form elongate, oval, moderately convex. Elytron with narrow, complete lateral vitta, one median, basal spot, one oblique discal vitta extending from disc nearly to apical vitta (Fig. 443d). Postcoxal line nearly reaching hind margin of first abdominal sternum, slightly flattened along margin, area within line alutaceous, finely punctured. Male genitalia as in Figure 443a–c.

Discussion. The dorsal color pattern of *H. consimilis* is most like that of *H. troglodytes*, but the male genitalia are so dissimilar in these 2 species that I place them in different groups. Crotch (1873) first considered *H. consimilis* to be a junior synonym of *H. moerens* LeConte, and this opinion has been followed by authors ever since. In fact, *H. moerens* is much more closely allied to *H. quadrivittata* than to *H. consimilis*, and I regard *H. consimilis* as a valid species. Because of this confusion as to the true identity of *H. consimilis*, Dobzhansky (1941) described as new the form he called *H. disconotata canadensis*, which is identical in all respects to *H. consimilis*. The type of *H. consimilis* is a unique (holotype) female labeled "(blue clipped disc)/4661/Type 6720 (red paper)/*H. consimilis* Lec."

Type locality. Of *consimilis*, Lake Superior; of *canadensis*, Whitford Lake, Alberta.

Type depository. Of *consimilis*, MCZ; of *canadensis*, CAS.

Distribution. Figure 444. ALBERTA: Whitford Lake. QUEBEC: Duparquet. NEW YORK: Cascade.

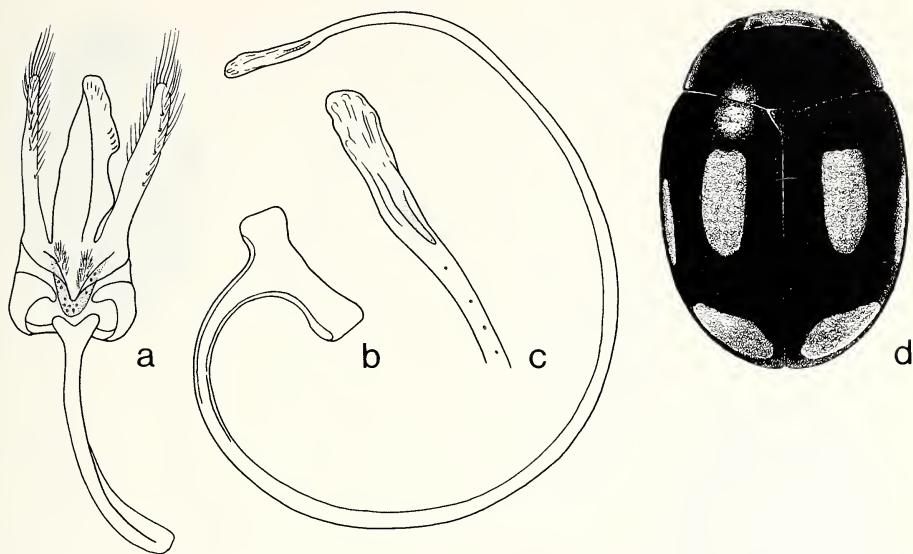


Fig. 445. *Hyperaspis spiculinota*.

Hyperaspis spiculinota Fall
Fig. 445a-d; Map, Fig. 444

Hyperaspis spiculinota Fall, 1901, p. 232. — Leng, 1920, p. 212. — Korschevsky, 1931, p. 197. — Dobzhansky, 1941, p. 72.

Diagnosis. Length 2.40 to 3.0 mm, width 1.70 to 2.10 mm. Form elongate, feebly oval, dorsoventrally flattened. Elytron with wedge shaped discal spot, spot on lateral margin in apical half, and transverse apical spot sometimes touching lateral spot (Fig. 445d). Postcoxal line nearly reaching hind margin of first abdominal sternum, slightly flattened along margin, area within line alutaceous, finely punctured. Male genitalia as in Figure 445a-c.

Discussion. The dorsal color pattern is like that of a variation of *H. quadrioculata*, but the strongly flattened form and the wedge shaped discal spot on each elytron are characteristic of *H. spiculinota*. The type of male genitalia causes me to place this species in the *undulata* group rather than the *postica* group where it would appear to belong on the basis of external characters. A single male type remains in the Fall collection labeled "Pom Cal 10/19/95/Type spiculinota/MCZ Type 24544 (red paper)/ H.C. Fall collection". Since Fall had more than one type specimen, I designate this male as the lectotype.

Type locality. Pomona, California (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 444. CALIFORNIA: Claremont; Pasadena; Santa Barbara Co.; Santa Paula.

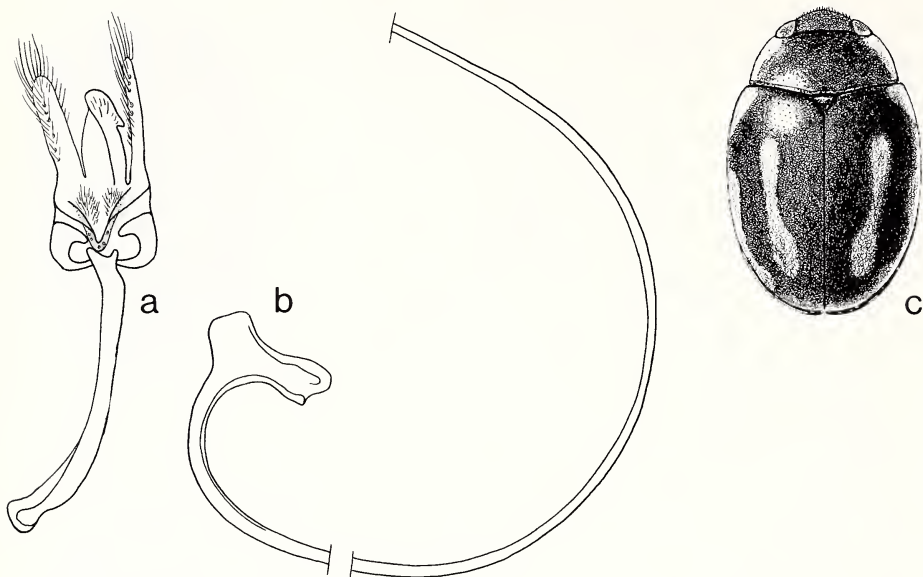


Fig. 446. *Hyperaspis brunnescens*.

quadrivittata group

Female pronotum with narrow yellow border (except *H. brunnescens* and *H. jasperensis*); form elongate, flattened; color pattern of elytron often vittate; male genitalia with strong lateral projection near apex of basal lobe.

Of the species included here, *H. jasperensis* is atypical in that the male head is black (the only species of *Hyperaspis* known to have that characteristic) and the female pronotum is entirely black. The body form and male genitalia of *H. jasperensis* are of the *quadrivittata* type, therefore I include it in the *quadrivittata* group in spite of the aberrant color pattern.

Hyperaspis brunnescens Dobzhansky

Fig. 446a-c; Map, Fig. 444

Hyperaspis brunnescens Dobzhansky, 1941, p. 77.—Wingo, 1952, p. 26.

Diagnosis. Length 2.30 to 2.50 mm, width 1.60 to 1.80 mm. Form elongate, oval, subdepressed. Pronotum of male mostly dull yellow; pronotum of female brownish black with indistinct, yellow lateral border. Elytron brownish black with 2 vittae, one complete marginal vitta and oblique discal vitta (Fig. 446c). Surface of elytron dull, strongly alutaceous. Postcoxal line not reaching hind margin of first abdominal sternum, slightly flattened along margin, area within line alutaceous, barely perceptibly punctured. Male genitalia as in Figure 446a, b.

Discussion. The dull dorsal surface and vittate color pattern of the elytron are distinctive for *H. brunnescens*. *Hyperaspis quadrivittata* has the same elytral pattern but is shiny on the dorsum.

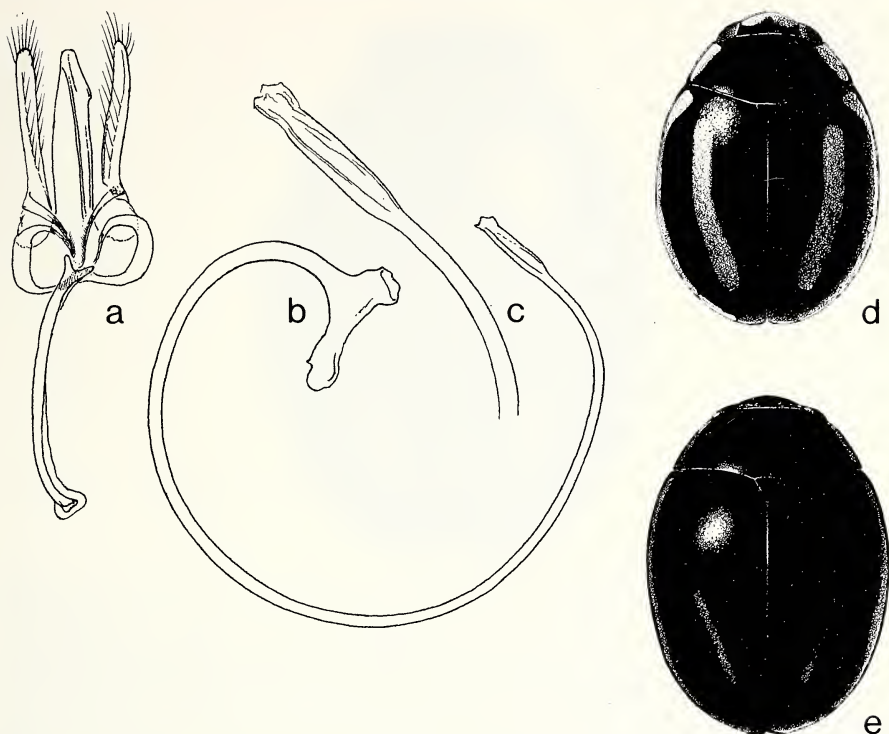


Fig. 447. *Hyperaspis quadrivittata*.

Type locality. Illinois.

Type depository. USNM (54219).

Distribution. Figure 444. ILLINOIS: State record. IOWA: Clarke Co.

Hyperaspis quadrivittata LeConte

Fig. 447a-e; Map, Fig. 444

Hyperaspis quadrivittata LeConte, 1852, p. 133.—Crotch, 1873, p. 381.—Crotch, 1874b, p. 233.—LeConte, 1880, p. 188.—Casey, 1899, p. 128.—Blatchley, 1910, p. 522.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 195.—Wingo, 1952, p. 26.—Belicek, 1976, p. 313.

Hyperaspis quadrivittata quadrivittata: Dobzhansky, 1941, p. 74.

Hyperaspis tetraneura Casey, 1908, p. 420.—Leng, 1920, p. 212.—Belicek, 1976, p. 313.

Hyperaspis quadrivittata variety *tetraneura*: Dobzhansky, 1941, p. 75.

Diagnosis. Length 2.0 to 2.70 mm, width 1.30 to 1.80 mm. Form elongate, oval, subdepressed. Elytron black with vittae as described for *H. brunnescens* except some specimens with lateral vitta incomplete (Fig. 447d, e). Postcoxal line as described for *H. brunnescens* except area within line strongly punctured. Male genitalia as in Figure 447a-c.



Fig. 448. *Hyperaspis moerens*.

Discussion. This is one of the most easily recognized species of *Hyperaspis* because of the strongly vittate appearance and elongate form (see comments under *H. brunescens*). *Hyperaspis oregona* of the *postica* group has the same basic color pattern, but the male genitalia of the 2 specimens are not at all alike and they are nearly allopatric.

The unique (holotype) female type of *quadrivittata* is labeled "(green disc)/4659/ Type 6719 (red paper)/*H. quadrivittata* LeC." LeConte (1852) stated that the type was "found near Long's Peak." The type of *tetraneura* in the Casey collection is a unique female (holotype).

Type locality. Of *quadrivittata*, Long's Peak, Colorado; of *tetraneura*, Boulder, Colorado.

Type depository. Of *quadrivittata*, MCZ; of *tetraneura*, USNM (35207).

Distribution. Figure 444. ALBERTA: Cypress Hills; Edmonton; Medicine Hat; Waterton. ARIZONA: Chiricahua Mts.; IDAHO: Boville. NORTH DAKOTA: Billings Co.; Grant Co., Lake Tschida. OREGON: Brothers; Harney Co., Tencent Lake; Prineville. WASHINGTON: Moses Canyon. WYOMING: Lonetree.

Hyperaspis moerens (LeConte)

Fig. 448; Map, Fig. 450

Oxynychus moerens LeConte, 1850, p. 238.—Crotch, 1874b, p. 239.—Korschefsky, 1931, p. 202.

Hyperaspis (Oxynychus) moerens: Mulsant, 1850, p. 694.

Hyperaspis moerens: LeConte, 1880, p. 189.—Dobzhansky, 1941, p. 78.

Diagnosis. Length 2.25 mm, width 1.70 mm. Form oval, subdepressed, pronotum abruptly narrower than elytral base, narrowed apically. Elytron black with obscure,

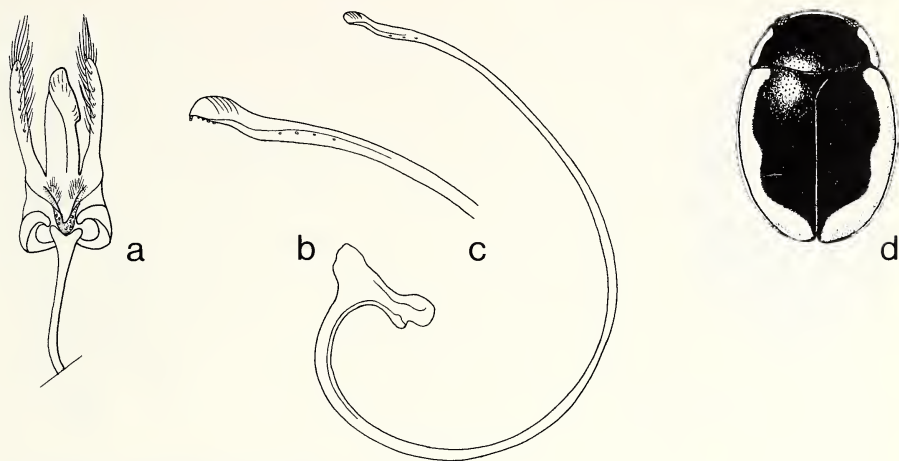


Fig. 449. *Hyperaspis protensa*.

obliquely triangular spot on apical declivity (Fig. 448). Postcoxal line nearly reaching hind margin of first abdominal sternum, slightly flattened along margin, area within line alutaceous, finely punctate. Male genitalia not known.

Discussion. I have seen only the type series (females) and one other female specimen of this species. The abruptly narrowed form of the pronotum is not shared by any other species of North American *Hyperaspis*, and I have no doubt that this is a valid species. No males were available, therefore the placement of *moerens* in this group is based on an external similarity to *quadrivittata*, which may be superficial. Two types presently exist in the LeConte collection, one of which, labeled "(blue clipped disc)/4671/Type 6721 (red paper)/*Oxynychus moerens* Lec. (Hyper. Muls.)", I designate and label as the lectotype, the other as a paralectotype.

Type locality. Lake Superior (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 450.

Hyperaspis protensa Casey

Fig. 449a-d; Map, Fig. 450

Hyperaspis protensa Casey, 1908, p. 417.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 194.—Dobzhansky, 1941, p. 57.

Diagnosis. Length 1.50 to 2.20 mm, width 1.0 to 1.50 mm. Form elongate, parallel sided. Elytron black with complete vitta on lateral margin (Fig. 449d), vitta often incomplete. Postcoxal line not approaching hind margin of first abdominal sternum, evenly curved throughout, area within line dull, alutaceous, distinctly punctured. Male genitalia as in Figure 449a-c.

Discussion. The color pattern of this southwestern species is similar to that of *H. inflexa* and *H. caseyi*, but the elongate, narrow form of *H. protensa* is completely unlike the short, rounded form of the other 2 species. Thus far *H. protensa* is known

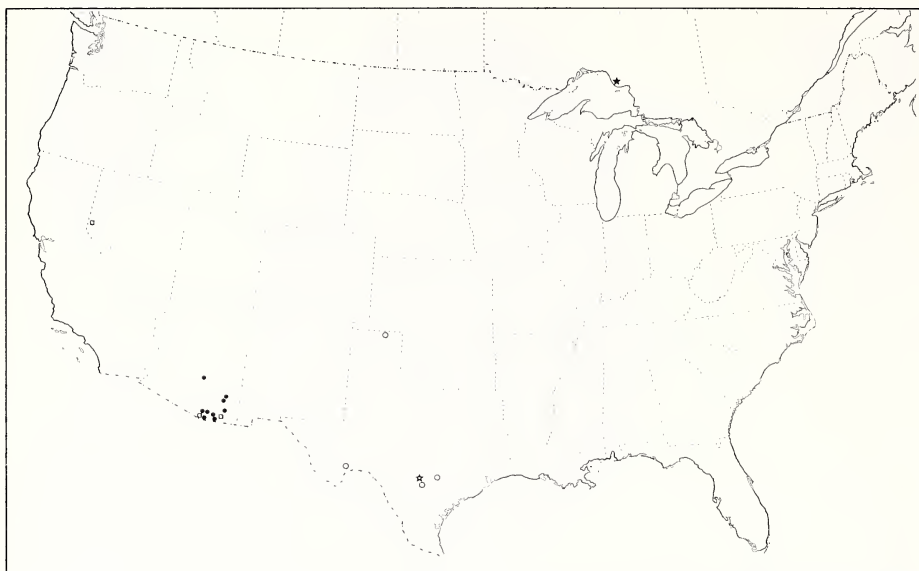


Fig. 450. Distribution. *Hyperaspis moerens* (star); *H. protensa* (dot); *H. punctata* (open circle); *H. simulans* (square); *H. imitator* (open star).

only from Arizona, and it is not likely to be confused with any other species of *Hyperaspis* occurring there. The type is a unique female (holotype) in the Casey collection.

Type locality. Nogales, Arizona.

Type depository. USNM (35185).

Distribution. Figure 450. ARIZONA: Dragoon Mts., Stronghold. Graham Mts.; Huachuca Mts., Copper Canyon; Pajarito Mts., Sycamore Canyon; Pinaleno Mts.; Santa Catalina Mts.; Santa Cruz Co., Parker Canyon; Santa Rita Mts., Box Canyon, Madera Canyon.

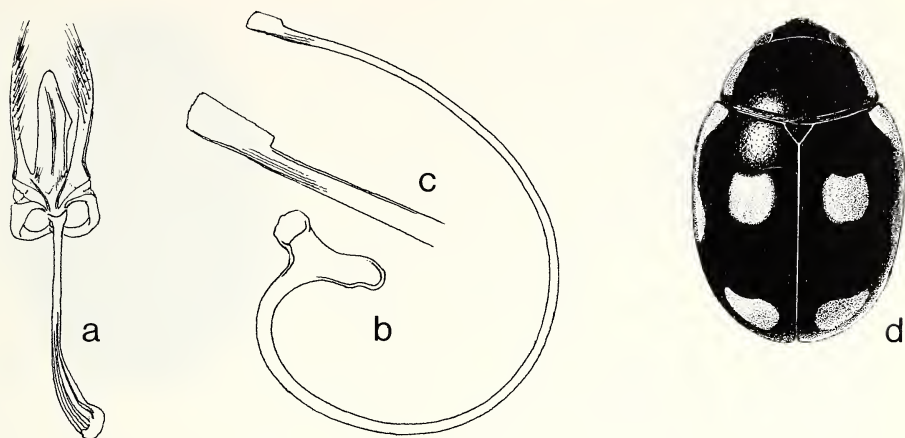


Fig. 451. *Hyperaspis punctata*.

Hyperaspis punctata LeConte

Fig. 451a–b; Map, Fig. 450

Hyperaspis punctata LeConte, 1880, p. 188.—Casey, 1899, p. 128.—Korschevsky, 1931, p. 194.—Dobzhansky, 1941, p. 67.—Wingo, 1952, p. 26.

Diagnosis. Length 1.70 to 2.30 mm, width 1.25 to 1.80 mm. Form elongate, nearly parallel sided, subdepressed. Elytron black with discal spot, apical spot, and irregular vitta on lateral margin from base past midpoint (Fig. 451d). Postcoxal line removed from hind margin of first abdominal sternum, evenly curved throughout, area within line dull, alutaceous, distinctly punctured. Male genitalia as in Figure 451a–c.

Discussion. This species and *H. protensa* are practically identical in body form and color pattern except that *H. punctata* has a discal spot on the elytron. The genitalia are similar but not identical, however, it is conceivable that these are forms of a single species. Material from northern Mexico is needed to ascertain the actual distribution of both *punctata* and *protensa*. A female in the LeConte collection labeled “Tex./184/Type 6717 (red paper)/*H. punctata* Lec”. is here designated and labeled as the lectotype. An additional female is designated a paralectotype.

Type locality. Texas (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 450. TEXAS: Bexar Co., Salado Creek, Fort Sam Houston; Flatonia; Perryton; Sanderson.

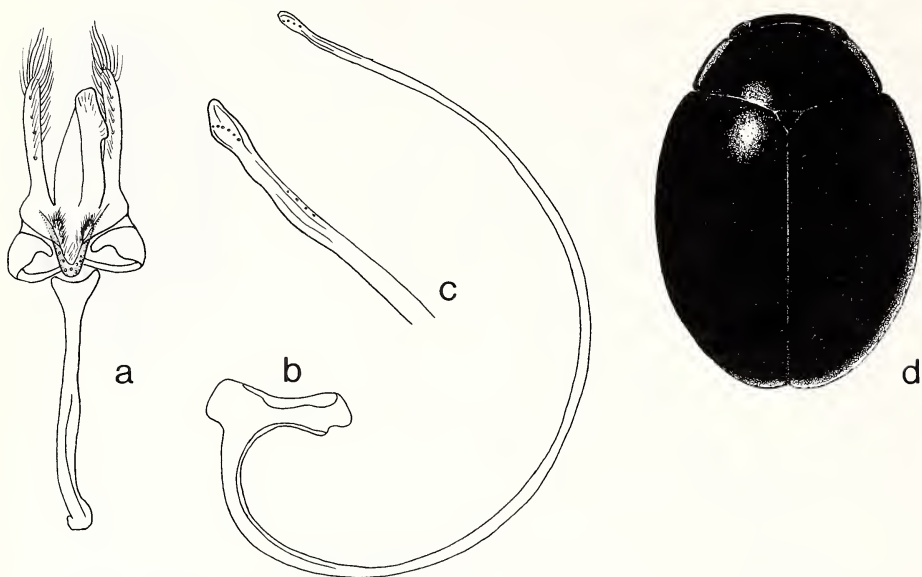


Fig. 452. *Hyperaspis simulans*.

Hyperaspis simulans Casey
Fig. 452a-d; Map, Fig. 450

Hyperaspis simulans Casey, 1899, p. 128.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 197.—Dobzhansky, 1941, p. 79.

Diagnosis. Length 2.30 to 2.70 mm, width 1.60 to 1.90 mm. Form regularly oval, moderately convex. Elytron entirely black except vague yellow area may be present on humeral angle (Fig. 452d). Postcoxal line nearly reaching hind margin of first abdominal sternum, slightly flattened along margin, area within line alutaceous, distinctly punctured. Male genitalia as in Figure 452a-c.

Discussion. The regularly oval form and nearly black, immaculate appearance characterize *H. simulans* externally, and enable it to be separated from other southwestern species of *Hyperaspis*. I have seen a single female from Reno, Nevada, which I regard as *H. simulans*, but this specimen has a small spot just posterior to the middle of the elytron on the lateral margin. Casey's type of *simulans* is a unique female (holotype).

Type locality. Arizona.

Type depository. USNM (35208).

Distribution. Figure 450. ARIZONA: Huachuca Mts.; Santa Cruz Co., Adobe Canyon. NEVADA: Reno.

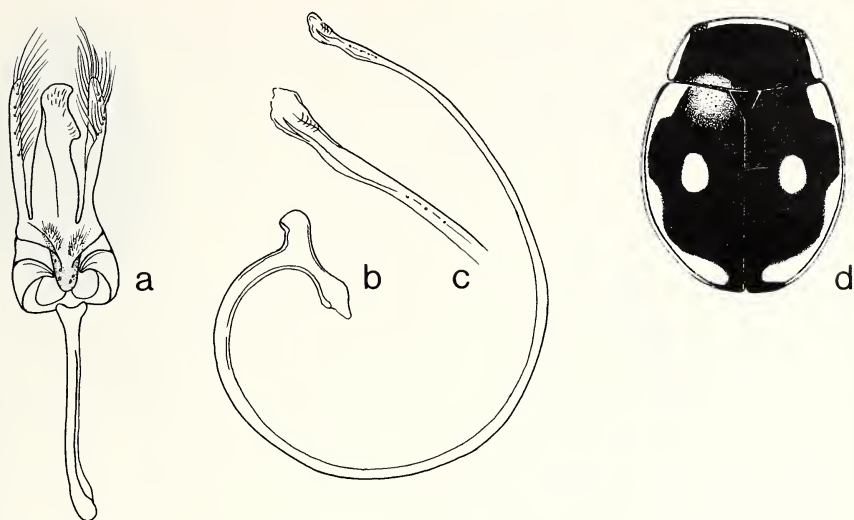


Fig. 453. *Hyperaspis imitator*.

***Hyperaspis imitator*, new species**

Fig. 453a–d; Map, Fig. 450

Description. Male, length 2.0 mm, width 1.60 mm. Form oval, moderately convex. Pronotum black with lateral area yellow; elytron black with discal spot and lateral yellow vitta from base to apex (Fig. 453d). Punctures on head fine, separated by a diameter or less; pronotal punctures coarser than on head, separated by a diameter or less; punctures on elytron slightly coarser than on pronotum, separated by less than to twice a diameter. Metasternum coarsely punctured laterally, punctures becoming fine, sparse toward midline. Abdominal sterna with fine, dense punctures except basal 2 sterna coarsely punctured. Postcoxal line not approaching hind margin of first abdominal sternum, evenly curved throughout, area within line alutaceous, sparsely punctured. Male genitalia as in Figure 453a–c.

Female, similar to male except length 2.25 mm, width 1.75 mm; head black; lateral pronotal border not as broadly yellow.

Holotype. Male. TEXAS: San Antonio, Olmos Park, 28-VI-1947, B. E. White Coll., sweeping *Ceanothus* sp. (CAS).

Allotype. Female. Same data as holotype. (CAS).

The male genitalia of *H. imitator* place it in the *H. quadrivittata* group; the dorsal color pattern of the male is exactly like that of *H. bensonica* males, but the female pronotum is yellow laterally, entirely black in *H. bensonica*. Because of the similarity in color pattern and also body form, males of *H. imitator* will probably be mixed with males of *H. bensonica* unless genitalia are examined. The holotype and allotype are the only specimens of *H. imitator* examined. The specific name refers to the resemblance of *H. imitator* to *H. bensonica*.

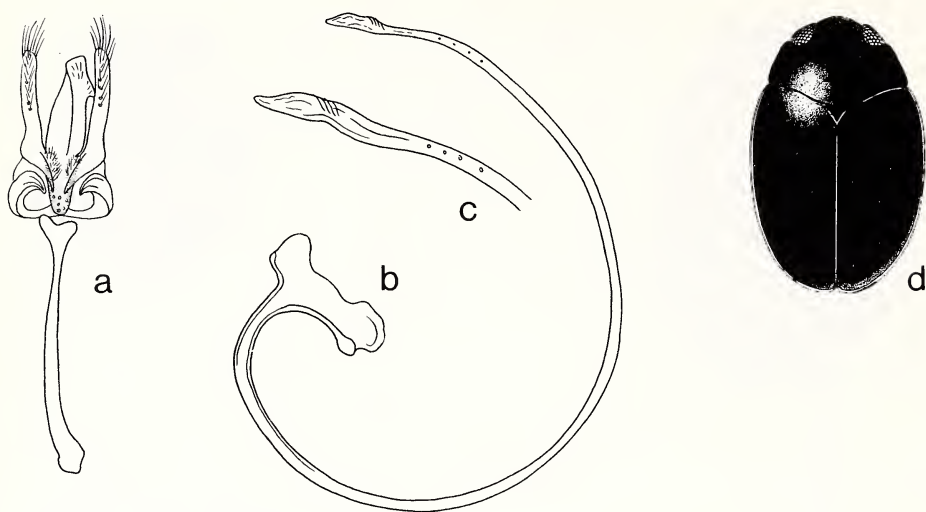


Fig. 454. *Hyperaspis jasperensis*.

Hyperaspis jasperensis Belicek

Fig. 454a-d; Map, Fig. 455

Hyperaspis jasperensis Belicek, 1976, p. 316.

Diagnosis. Length 1.50 to 2.00 mm, width 1.0 to 1.50 mm. Form elongate, slender, oblong. Head brownish black in both sexes. Pronotum brownish black in both sexes except lateral margin slightly paler. Elytron entirely brownish black (Fig. 454d). Postcoxal line nearly reaching hind margin of first abdominal sternum, slightly flattened along margin, area within line alutaceous, barely punctured. Male genitalia as in Figure 454a-c.

Discussion. The black female head, oblong form, and immaculate elytron characterize this little species. In addition to material from the type locality and the Northwest Territories, I regard 2 specimens from Colorado and one from Wyoming as being *H. jasperensis*. The latter 3 specimens are more flattened dorsoventrally than Alberta specimens, but the male genitalia are so similar that I consider them conspecific.

Type locality. Alberta, Jasper National Park, Bald Hills.

Type depository. CNC.

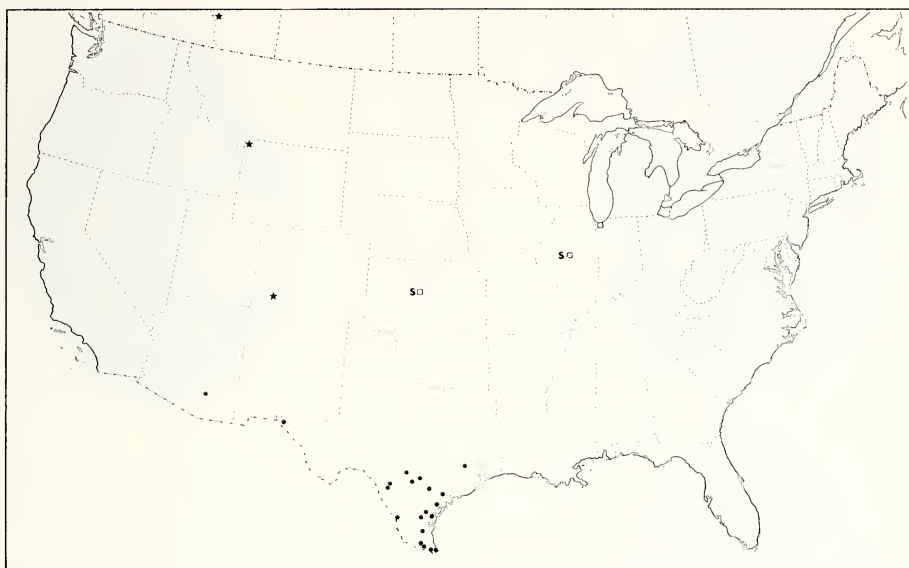


Fig. 455. Distribution. *Hyperaspis jasperensis* (star); *H. bolteri* (square); *H. trifurcata* (open circle).

Distribution. Figure 455. NORTHWEST TERRITORIES: Dempster, Richardson Mts. COLORADO: Argentine Pass. WYOMING: Yellowstone Nat. Park.

Hyperaspis species not assigned to groups

Two species, *H. bolteri* LeConte and *H. trifurcata* Schaeffer, are included here because they seem to have no affinities with other *Hyperaspis*, either North American species or species from south of the United States. I prefer to treat them in this way rather than create a probably meaningless "group" for each.

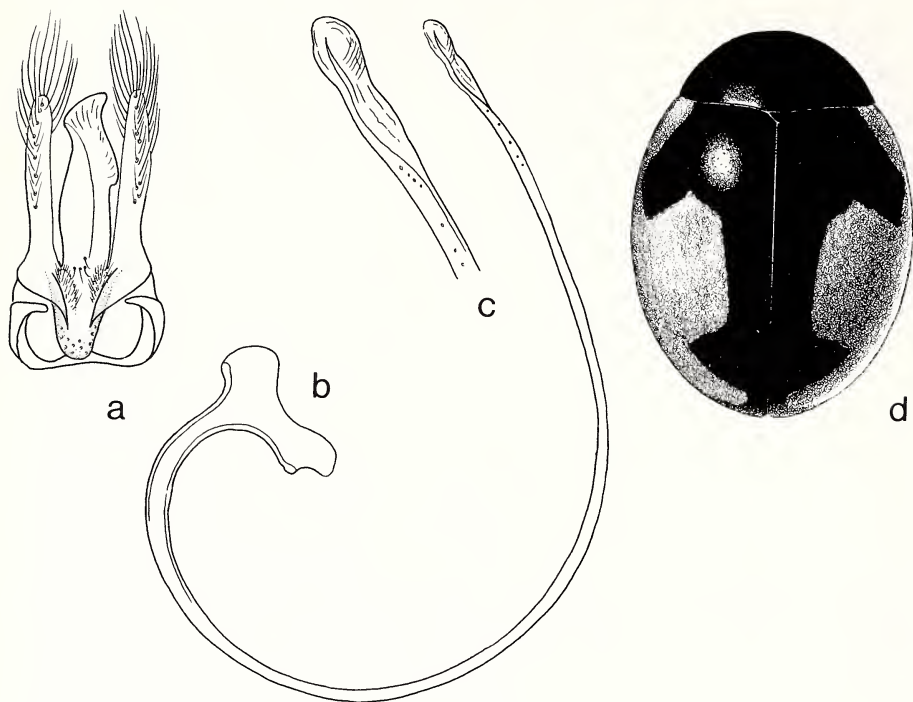


Fig. 456. *Hyperaspis bolteri*.

Hyperaspis bolteri LeConte
Fig. 456a-d; Map, Fig. 455

Hyperaspis bolteri LeConte, 1880, p. 186.—Casey, 1899, p. 121.—Blatchley, 1910, p. 522.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 185.—Wingo, 1952, p. 26.

Diagnosis. Length 3.0 to 3.25 mm, width 2.10 to 2.65 mm. Form regularly oval, convex. Male pronotum with narrow yellow area laterally; female pronotum entirely black; surface of pronotum dull, strongly alutaceous, punctures nearly invisible. Elytron dull black with yellowish orange lateral vitta broadly expanded onto disc medially (Fig. 456d). Postcoxal line widely separated from hind margin of first abdominal sternum, flattened along margin, area within line depressed basally, alutaceous, finely punctured. Male genitalia as in Figure 456a-c.

Discussion. Specimens of *H. bolteri* have been seen only from Illinois, Indiana, and Kansas. The highly distinctive color pattern and extremely dull pronotal surface characterize this species. A female in the LeConte collection labeled "Ill./Type 6706 (red paper)/*Hyperaspis bolteri* Lec." is here designated and labeled the lectotype.

Type locality. Illinois (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 455. INDIANA: Pine (Lake Beach). KANSAS: State record.

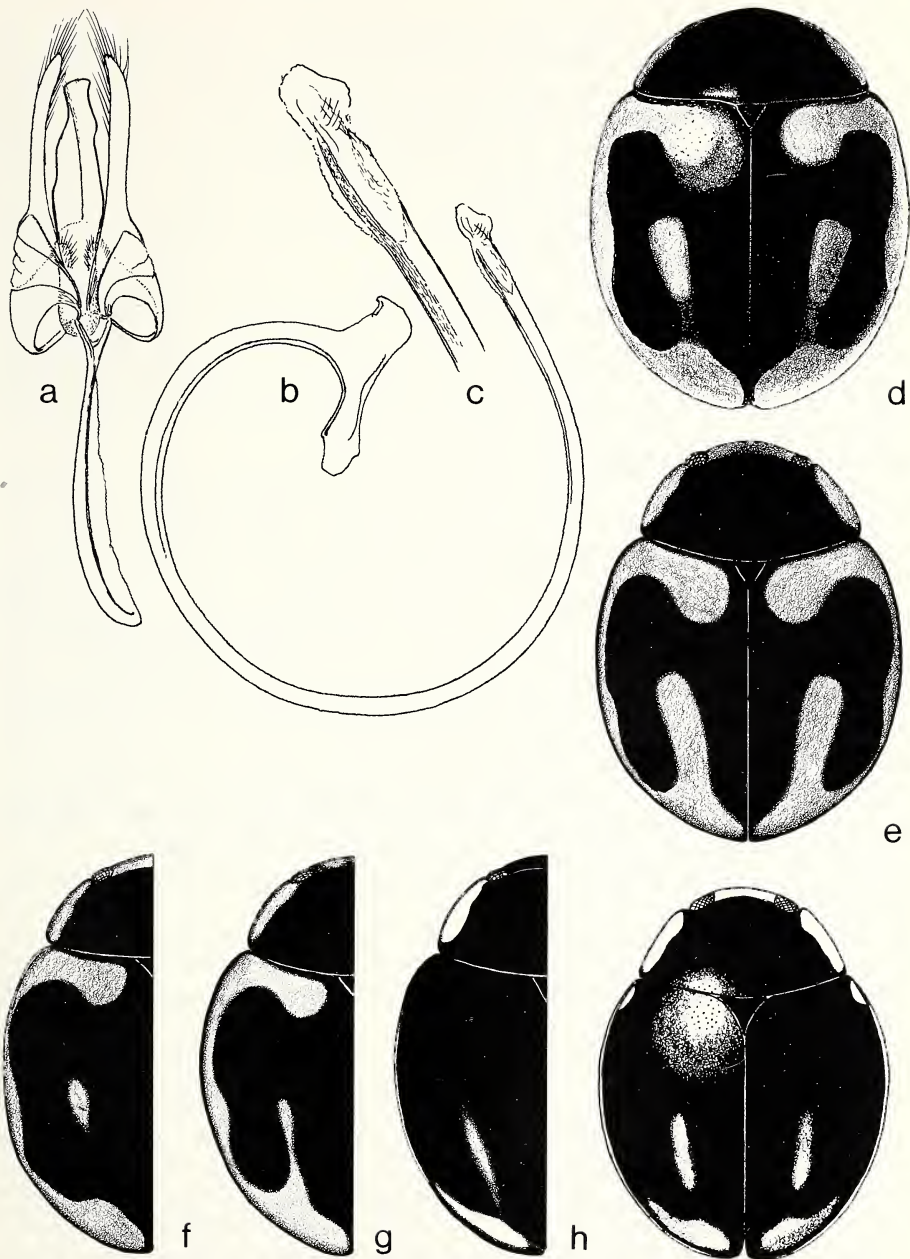


Fig. 457. *Hyperaspis trifurcata*.

Hyperaspis trifurcata Schaeffer

Figs. 457a-i; Map, Fig. 455

Hyperaspis trifurcata Schaeffer, 1905, p. 143.—Casey, 1908, p. 420.—Leng, 1920, p. 211.—Korschefsky, 1931, p. 198.—Dobzhansky, 1941, p. 63.

Hyperaspis durangoensis Casey, 1924, p. 167.—Korschefsky, 1931, p. 187.—Dobzhansky, 1941, p. 64. **New Synonymy.**

Hyperaspis disjunctus Casey, 1924, p. 168.—Korschefsky, 1931, p. 187.—Dobzhansky, 1941, p. 64. **New Synonymy.**

Diagnosis. Length 2.30 to 3.0 mm, width 1.80 to 2.40 mm. Form oval, convex. Head sparsely pubescent except pubescence on clypeus dense, long. Pronotum of both sexes black with narrow, reddish yellow, lateral border. Elytron black with variable red or yellow pattern (Fig. 457e-i). Postcoxal line not reaching hind margin of first abdominal sternum, evenly curved throughout, area within line alutaceous, densely punctured. Male genitalia as in Figure 457a-c.

Discussion. The elytral color pattern is somewhat variable, but always distinctive for this species. No other North American species of *Hyperaspis* has a comparable color pattern. The labrum and clypeus are extremely hairy, although there is no pubescence on the frons. Comparison of the genitalia of *H. trifurcata* with those of *H. durangoensis* has shown them to be identical, therefore I regard *H. durangoensis* as a junior synonym of *H. trifurcata*. *Hyperaspis disjunctus* is only a color variant of *trifurcata* from the same type locality as *H. durangoensis*, and is also a junior synonym. There are 2 types of *H. durangoensis* in the Casey collection and I here designate and label a male as the lectotype, the other specimen as a paralectotype. The type of *H. disjunctus* is a unique female (holotype). I have seen 2 type specimens of *H. trifurcata* and here designate and label a male labeled "Tex./trifurcata type/Cotype No. 42550 U.S.N.M." as the lectotype, the other specimen as a paralectotype.

Type locality. Of *durangoensis* (lectotype here designated) and *disjunctus*, Durango City, Durango, Mexico; of *trifurcata*, Texas (lectotype here designated).

Type depository. Of *durangoensis* (35168), *disjunctus* (35169), and *trifurcata* (42550), (USNM).

Distribution. Figure 455. ARIZONA: Pima Co., Tucson. TEXAS: S. of Alamo; Alice; Brownsville; College Station; Corpus Christi; El Paso; Falfurrias; Floresville; Isabel; Kerrville; Laredo; Refugio Co., Tivoli; Sabinal; San Antonio; San Diego; Seguin; Uvalde; Victoria.

Genus *Brachiacantha*

Brachiacantha Dejean, 1837, p. 458.—Melsheimer, 1847, p. 178.—LeConte, 1852, p. 130.—Belicek, 1976, p. 317.

Brachyacantha: Chevrolat, 1842, p. 704 (unjustified emendation).—Mulsant, 1850, p. 520.—Crotch, 1873, p. 377.—Crotch, 1874b, p. 210.—Chapuis, 1876, p. 228.—Weise, 1885, p. 5.—Gorham, 1894, p. 184.—Wickham, 1894, p. 299.—Casey, 1899, p. 116.—Blatchley, 1910, p. 520.—Leng, 1911, p. 281.—Wheeler, 1911, p. 169.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 202.—Wingo, 1952, p. 18.—Hatch, 1961, p. 161.—J. Chapin, 1974, p. 44. Type-species; *Coccinella dentipes* F., by subsequent designation of Crotch, 1873, p. 377.

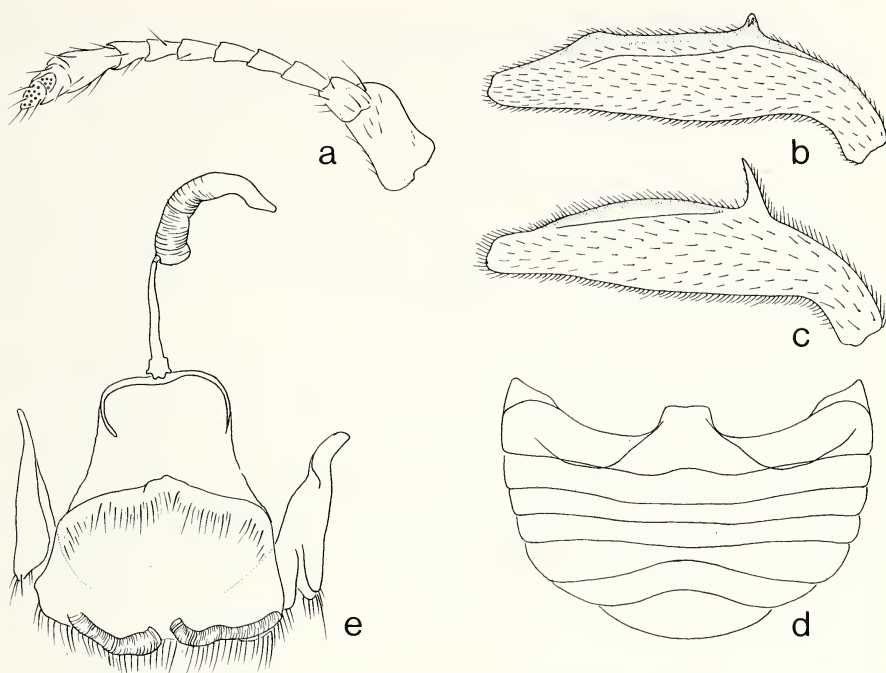


Fig. 458. *Brachiacantha* sp. a. Antenna. b, c. Front tibiae. d. Abdomen. e. Female genitalia.

Hyperaspini with body elongate oval to rounded, strongly convex; dorsal surface glabrous except head indistinctly pubescent. Head usually entirely yellow in male, at least with clypeus brown or black in female. Antenna 11-segmented (Fig. 458a); antennal insertion concealed. Eye narrowly emarginated by expansion of epistoma. Scutellum wider than long. Epipleuron of elytron narrow, not descending externally, strongly excavated for reception of middle and hind femoral apices. Prosternum with or without 2 carinae, if carinae present, then only slightly convergent apically. Anterior tibia grooved or flanged, with spine at about basal $\frac{2}{3}$ (Fig. 458b, c); tarsal claw with large, basal, quadrate lobe. Abdomen with 7 apparent sterna in male, 6 in female; sexual modification present on sterna 3–6 in male (depending on group). Postcoxal line on first abdominal sternum incomplete (*Scymnus* type) (Fig. 458d). Male genitalia with basal lobe symmetrical or asymmetrical; paramere not rooted in phallobase, longer than phallobase (Figs. 459a, 471a); siphro strongly sclerotized with fan-like membranous lobes in apical $\frac{1}{3}$ (except *indubitabilis* and *lepida* groups) (Fig. 459c). Female genitalia with simple spermathecal capsule, infundibulum present, coxal plate transverse (Fig. 458e).

The spine on the anterior tibia and the emarginate eyes will distinguish *Brachiacantha* from all other hyperaspine genera. *Brachiacantha* is a New World genus containing approximately 50 species and subspecies which range from Canada to Argentina. The original spelling of the generic name, *Brachiacantha*, was published by Dejean (1837) without a generic description, but the name was validated by the

inclusion of several previously described species. Chevrolat (1842) emended the name to *Brachyacantha*, an unjustified emendation which has been used by all subsequent authors except Melsheimer (1847), LeConte (1852), and Belicek (1976).

The larvae of members of this genus for which data are available feed on Coccidae in ant nests. This was well documented by Wheeler (1911), who found larvae of *B. quadripunctata quadripunctata* in nests of "*Lasius umbratus* var. *aphidicola*" at Great Blue Hill near Boston, Massachusetts. Wheeler also mentioned the recording of similar observations by Smith (1886), Schwarz (1890), and Mann (1911). Adult host preferences are almost completely unknown. Hosts mentioned in the literature are "mealybugs," "root coccids and root aphids;" *Pemphigus* sp.; *Toumeyella parvicornis* (Cockerell); *Dysmicoccus brevipes* (Cockerell).

This genus was revised by Leng (1911), and his classification has remained unchanged since then except for descriptions of some new species. The classification proposed herein is based on Leng's, but there are a number of changes in synonymy. Twenty six species and subspecies are here considered to occur north of Mexico.

North American *Brachiacantha* can be divided into 4 groups based on the type of male genitalia and modifications of the male abdominal sterna. I designate these as the *dentipes*, *ursina*, *lepida* and *indubitabilis* groups. Morphological distinctions are discussed under each group heading. The male genitalia of *Brachiacantha* species are not diagnostic in many instances, and other, often less satisfactory characteristics such as color, body form, etc., must be used to recognize species.

KEY TO SPECIES OF *Brachiacantha*

1. Anterior tibia with arcuate flange on outer margin (Fig. 458c); male abdomen with 3rd sternum bicuspid (Fig. 460d) 2
- Anterior tibia not noticeably flanged, or if so, then flange not arcuate (Fig. 458b); male abdomen with 3rd sternum lacking cusps (Fig. 458d) 15
- 2(1). Elytron with transverse median band only (Fig. 470e); Arizona, Texas *subfasciata* Mulsant
- Elytron with transverse median band or not, if median band present, then additional maculation also present; Arizona, Texas and elsewhere 3
- 3(2). Species occurring east of the Mississippi River 4
- Species occurring west of the Mississippi River 6
- 4(3). Form oval to rounded; elytron with median band composed of connected spots (Fig. 459d); Florida *decora* Casey
- Form distinctly oblong; elytron with median band usually appearing entire 5
- 5(4). First abdominal sternum with area within postcoxal line yellow or yellowish brown; male pronotum yellowish orange except feeble dark maculae at base (Fig. 463e); 3rd abdominal sterna of male with cusps reduced (Fig. 463d); Mississippi *soltai*, n. sp.
- First abdominal sternum with area within postcoxal line black, brown, or only partially yellow; male pronotum mostly black or dark brown, 3rd abdominal sternum of male with cusps prominent (Fig. 462d); Mississippi and elsewhere *dentipes* (F.)
- 6(3). Species occurring in California, Nevada, Oregon (Fig. 464) . *blaisdelli* Nunenmacher
- Species occurring east of Nevada and Oregon 7
- 7(6). Specimens from Arizona 8
- Specimens not from Arizona 10

- 8(7). Punctures on head fine, about equal in diameter to eye facet; median $\frac{1}{3}$ of 3rd and 4th abdominal sterna with punctures fine, nearly absent; elytron with single, median, orange band (Fig. 470e) *subfasciata* Mulsant
- Punctures on head coarse, diameter larger than eye facet; median $\frac{1}{3}$ of 3rd and 4th abdominal sterna distinctly, densely punctured; elytron never with single, median, orange band 9
- 9(8). Male head entirely yellow; 6th abdominal sternum of male strongly concave medially; Arizona and elsewhere *tau* LeConte
- Male head black except vertex and frons with orange spot; 6th abdominal sternum of male nearly flat; Santa Rita Mts., Arizona *stephani*, n. sp.
- 10(7). Length less than 3.50 mm; male abdomen with cusps on 3rd abdominal sternum reduced, 4th sternum with equally reduced cusps (Fig. 468d); south Texas *barberi*, n. sp.
- Length more than 3.50 mm; male abdomen with prominent cusps on 3rd abdominal sternum, 4th sternum without cusps, or if present, reduced; south Texas and elsewhere 11
- 11(10). Form oval to rounded; elytron with median band composed of connected spots, apical spot present (Fig. 459d), all maculation yellow; south Texas ... *decora* Casey
- Form oblong; elytron with median band more or less straight, apical spot present or not, or elytron mostly yellow, all maculation orange or yellowish orange except some northern specimens of *tau* with maculation yellow; south Texas and elsewhere 12
- 12(11). Male abdomen with cusps on 3rd sternum separated by the width of a cusp or more (Fig. 460d) 13
- Male abdomen with cusps separated by $\frac{1}{2}$ the diameter of a cusp, or cusps connected by an intermediate ridge (Fig. 466d) 14
- 13(12). Length 4.20 mm or more; punctures on head coarse, diameter larger than eye facet; median $\frac{1}{3}$ of 3rd and 4th abdominal sterna distinctly, densely punctured; Montana and Idaho to west Texas *tau* LeConte
- Length 4.0 mm or less; punctures on head fine, about equal in diameter to eye facet; median $\frac{1}{3}$ of 3rd and 4th abdominal sterna with punctures fine, nearly absent; south Texas *subfasciata* Mulsant
- 14(12). Male abdomen with cusps on 3rd sternum distinctly, strongly connected by a ridge, ridge feebly, triangularly depressed medially (Fig. 466d); elytron usually with single apical spot (Fig. 466f), pattern often variable (Fig. 466e, f); south and central Texas *quadrillum* LeConte
- Male abdomen with cusps on 3rd sternum distinctly separated (Fig. 462e), if slightly connected, then intermediate ridge strongly, arcuately depressed medially; elytron never with single apical spot; Kansas, Colorado, New Mexico .. *dentipes* (F.)
- 15(1). Elytron yellow with 2 median black spots, plus 2 black spots on suture confluent with spots on opposite elytron (Fig. 493d) *lepida* Mulsant
- Elytron not as described above 16
- 16(15). Anterior tibia with prominent, rounded tooth on outer margin near tarsal insertion, tooth angled inward (Fig. 479d); Arizona *arizonica* Schaeffer
- Anterior tibia with feeble tooth on outer margin near tarsal insertion, tooth not angled inward (Fig. 458b) Arizona and elsewhere 17
- 17(16). Elytron black with large basal and apical spots (Fig. 482d); Florida 18
- Elytron not as described above; Florida and elsewhere 19
- 18(17). Form oval (Fig. 483d); spots on elytron orange, anterior spot entire *querceti* Schwarz
- Form round (Fig. 482d); spots on elytron yellow, anterior spot with hind margin partially divided *schwarzi*, n. sp.

- 19(17). Elytron yellow, suture and 2 spots black (Fig. 489d), spots sometimes feebly confluent with suture; Manitoba and Alberta to Colorado, Nebraska (also see *illustris*) *albifrons* (Say)
 - Elytron black with yellow spots, or mostly yellow with variable black maculation, not as described above 20
- 20(19). Elytron black, maculation variable but always lacking discal spot, species occurring east of Texas 21
 - Elytron black with discal spot, or mostly yellow with variable black maculation; Texas and elsewhere 22
- 21(20). Elytron with basal and apical spots, male with additional feeble anterolateral spot (Fig. 486d) *quadripunctata quadripunctata* (Melsheimer)
 - Elytron with basal and apical spots, plus median spot on lateral margin, male with additional anterolateral spot sometimes connected to basal spot (Fig. 487d) *quadripunctata flavifrons* Mulsant
- 22(20). Maculation on elytron consisting of 3 spots, 2 median, one apical, without basal spot (Fig. 491d); spine on anterior tibia slender; occurring east of Mississippi River *indubitabilis* Crotch
 - Maculation on elytron not as described above, or if so, then occurring west of Mississippi River; spine on anterior tibia usually broad, triangular 23
- 23(22). Elytron with 5 large yellow spots, spots may be partially confluent or confluent to the extent that the elytron is mostly yellow; length less than 3.0 mm; Texas and Louisiana 24
 - Elytron with maculation variable, if with 5 yellow spots, then spots reduced in size, or species not occurring in Texas or Louisiana 25
- 24(23). Outline of spots on elytron indistinct, often partly confluent or mostly confluent (Fig. 485d, e) *bollii* Crotch
 - Outline of spots on elytron distinct, spots not confluent (Fig. 480d) ... *testudo* Casey
- 25(23). Elytron with spots confluent in apical ½, humeral and basal spot present (Fig. 484d); Florida *floridensis* Blatchley
 - Elytron not as described above; Florida and elsewhere 26
- 26(25). Length less than 3.0 mm; form oval; head coarsely, densely punctured; elytron with 5 small, yellow spots (Fig. 474d) *decempustulata* (Melsheimer)
 - Length usually more than 3.0 mm (except *felina*); form oblong oval or round; head finely, indistinctly punctured; elytron with color pattern variable, but usually with 5 yellow spots 27
- 27(26). Form round (Fig. 471d) 28
 - Form elongate oval (Fig. 478d) 29
- 28(27). Length 3.0 mm or less; male pronotum with anterior margin of median black area irregular, slightly emarginate at middle (Fig. 472d) *felina* (F.)
 - Length 3.0 mm or more; male pronotum with anterior margin of median black area straight, not emarginate at middle (Fig. 471d) *rotunda*, n. sp.
- 29(27). Elytron with 5 large, yellow spots (Fig. 476d); eastern Canada and Virginia to Manitoba and Iowa *ursina* (F.)
 - Elytron with 5 yellow spots, or with variable maculation; occurring mostly west of 100th meridian 30
- 30(29). Elytron usually black with 5 yellow spots (Fig. 476d), or with variable maculation (Fig. 476e, f); South Dakota to New Mexico, west to British Columbia and northern California *uteella* Casey
 - Elytron yellow with sutural margin and 2 spots black, black areas often confluent; Manitoba to Colorado, west to Alberta and Idaho 31

- 31(30). Black spots on elytron usually not confluent (Fig. 489d); form slender, elongate; distribution mostly Great Plains *albifrons* (Say)
 – Black spots on elytron nearly always confluent (Figs. 490d–f); form oval, robust; high altitudes, Idaho, Montana, Wyoming *illustris* Casey

dentipes group

Anterior tibia with arcuate flange on margin, widest just before spine (Fig. 458c); abdomen of male with 3rd sternum bicuspid (Fig. 460d), 4th and 5th sterna modified; basal lobe of male genitalia asymmetrical, apex usually abruptly bent to the left in ventral view (Fig. 459a), siphon with fan-like membranous lobes (Fig. 459c).

This group contains Leng's (1911) group 1 and group 2 which I have combined because the features of the tibia, male abdomen, and male genitalia are essentially the same in both groups. Leng used the body shape and color pattern to distinguish his "groups" from each other, however, I do not consider these characteristics significant at the group level.

Brachyacantha decora Casey

Fig. 459a–e; Map, Fig. 461

Brachyacantha decora Casey, 1899, p. 119.—Bowditch, 1902, p. 206.

Brachyacantha bistrispustulata var. *decora*: Leng, 1911, p. 298.—Leng, 1920, p. 213.

Brachyacantha bistrispustulata ab. *decora*: Korschefsky, 1931, p. 203.

Brachyacantha bistrispustulata var. *minor* Leng, 1911, p. 298.—Leng, 1920, p. 213.

New Synonymy.

Brachyacantha bistrispustulata ab. *minor*: Korschefsky, 1931, p. 203.

Diagnosis. Length 3.0 to 4.20 mm, width 2.30 to 3.20 mm. Form oval to rounded. Pronotum of male mostly yellow with median black area not reaching anterior margin; pronotum of female black except broad lateral area yellow. Elytron black with yellow apical spot and median band composed of 2 connected spots (Fig. 459d). Postcoxal line angulate. Male genitalia as in Figure 459a–c.

Discussion. The yellow maculation on the elytron and oval to rounded body form will distinguish *B. decora* from other species occurring in south Texas. This name may be only a synonym or a subspecies of *B. bistrispustulata* F. (Fig. 459e) but I prefer to regard *B. decora* as a valid species until the Mexican and Central American species are examined in detail. There are 5 type specimens in the Casey collection, and I here designate and label a male as the lectotype, the remainder as paralectotypes.

The type of *B. bistrispustulata* var. *minor* Leng is apparently a depauperate example of *B. decora* having the median band on the elytron composed of separated spots. The type locality is Brownsville, therefore the name *minor* cannot be maintained in subspecific status. The type specimen was not located.

Type locality. Of *decora* and *minor*, Brownsville, Texas (lectotype of *decora* here designated).

Type depository. Of *decora*, USNM (35574); of *minor*, not located.

Distribution. Figure 461. ARIZONA: Phoenix. FLORIDA: Broward Co., Andytown; Dade Co., Matheson Hammock; Miami; Monroe Co., Key Largo; Palm Beach

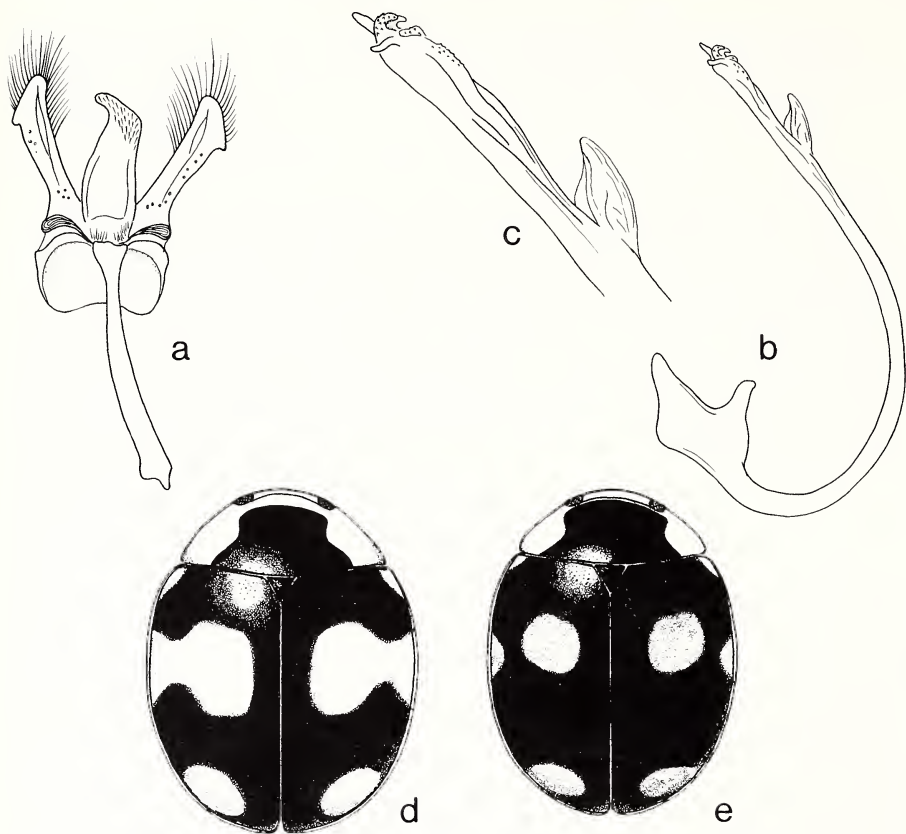


Fig. 459. *Brachiacantha decora*.

Co., Lake Worth; West Palm Beach. TEXAS: Beeville; Big Bend National Park; Brownsville; Del Rio; Devils River; Edna; Harlingen; Mission; New Braunfels; Richmond; Sabinal; San Antonio; Uvalde; Victoria; Webb Co., 30 mi. E. Laredo.

Brachiacantha tau LeConte

Fig. 460a-g; Map, Fig. 461

Brachiacantha tau LeConte, 1859d, p. 28.

Brachyacantha tau: Crotch, 1873, p. 378.—Crotch, 1874b, p. 212.—Leng, 1911, p. 305.—Leng, 1920, p. 213.—Korschefsky, 1931, p. 207.

Diagnosis. Length 4.40 to 5.50 mm; width 3.0 to 3.80 mm. Form oblong. Pronotum of male mostly yellow with small, black, basal area in northern specimens, mostly black with narrow anterior margin and broad lateral area yellow in southern specimens; pronotum of female mostly black except broad lateral area yellow, anterior margin narrowly yellow in most northern specimens. Color pattern on elytron variable from mostly yellow or orange in northern specimens (Fig. 460e), to a pattern

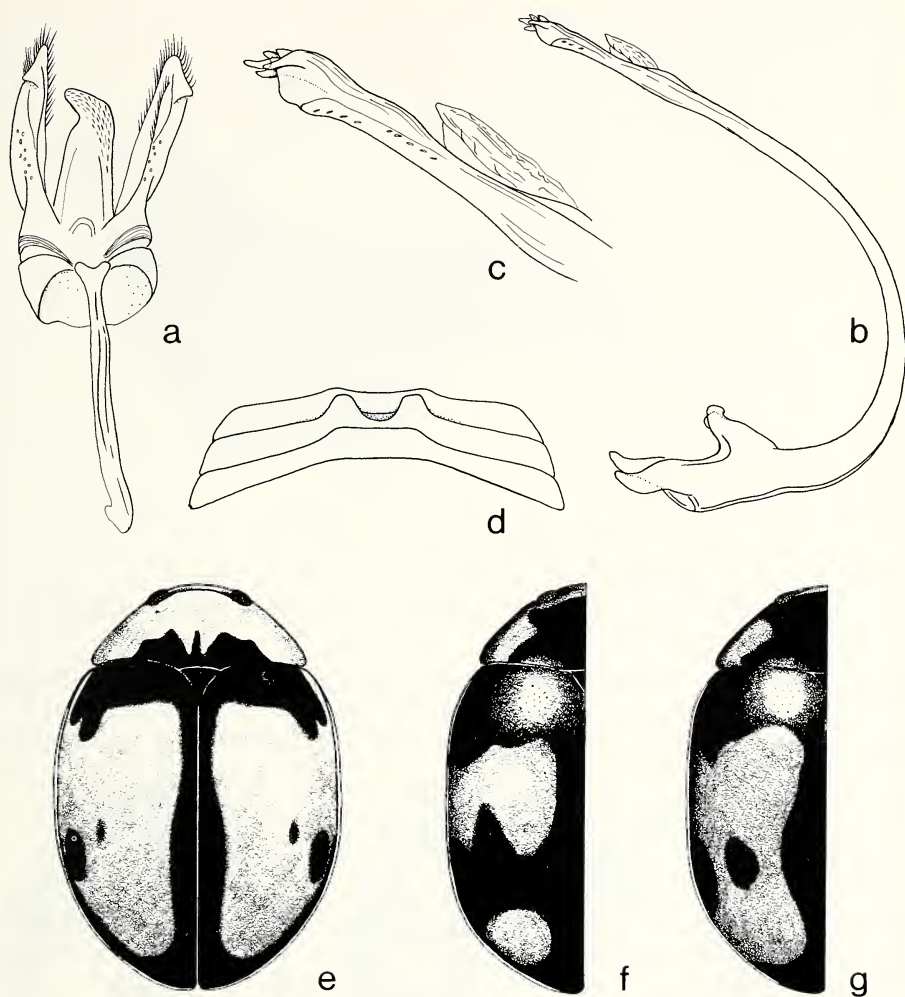


Fig. 460. *Brachiacantha tau*.

resembling that of *B. decora* in southern specimens (Figure 460f, g). Postcoxal line angulate; male abdominal cusps separated by more than the width of a cusp (Fig. 460d). Male genitalia as in Figure 460a-c.

Discussion. The pale northern specimens are easily recognized, but the usually darker southern specimens can be confused with other species of the *dentipes* group unless the male abdominal cusps are compared as indicated by statements in the key to species. LeConte (1859) had a single male type specimen (holotype) labeled "(green disc)/male sign/Type 6703(red paper)/*B. tau Lec*".

Type locality. Fort Riley, Kansas.

Type depository. MCZ.

Distribution. Figure 461. ARIZONA: Huachuca Mts.; Patagonia; Williams. COL-

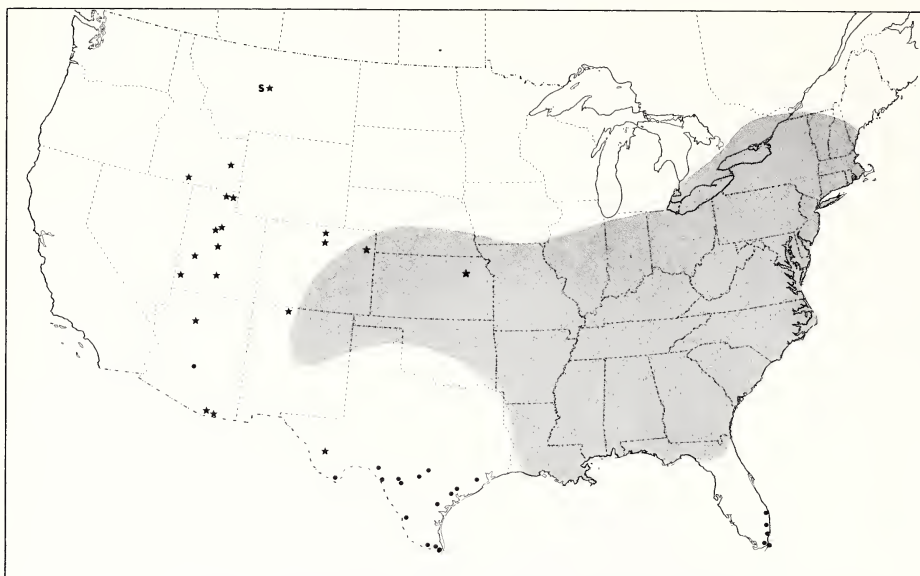


Fig. 461. Distribution. *Brachiacantha decora* (dot); *B. tau* (star); *B. dentipes* (shaded).

ORADO: Boulder; Valmont Butte; Fort Collins; Wray. IDAHO: Hansen; Idaho Falls. MONTANA: state record. NEW MEXICO: Rio Arriba Co. TEXAS: Alpine. UTAH: Cache Co., Cornish; Logan Canyon; Manti; Millard Co., Parowan; Provo Canyon; Torrey; Utah Co.

Brachiacantha dentipes (F.)

Fig. 462a-h; Map, Fig. 461

- Coccinella dentipes* F., 1801, p. 381.—Olivier, 1808, p. 1051.—Say, 1835, p. 202.
Brachyacantha dentipes: Mulsant, 1850, p. 525.—Crotch, 1873, p. 378.—Casey, 1899, p. 120.—Nunenmacher, 1909, p. 162.—Leng, 1911, p. 300.—Korschefsky, 1931, p. 204.—Wingo, 1952, p. 27.—J. Chapin, 1974, p. 44.
Brachyacantha socialis Casey, 1899, p. 119.—Wingo, 1952, p. 27.
Brachyacantha dentipes socialis Leng, 1911, p. 301.
Brachyacantha dentipes ab. *socialis*: Korschefsky, 1931, p. 204.
Brachyacantha dentipes var. *separata* Leng, 1911, p. 31.—Wingo, 1952, p. 27.
Brachyacantha dentipes ab. *separata*: Korschefsky, 1931, p. 204.

Diagnosis. Length 4.75 to 6.30, width 3.60 to 4.60 mm. Form oblong, sometimes slightly oval. Pronotum of male mostly black except narrow anterior margin and wide lateral area yellow or orange; pronotum of female similar to male except anterior margin black. Elytron black with orange or yellow apical spot and irregular median band varying in width and shape (Fig. 462f-h). Postcoxal line angulate; male abdominal cusps separated by about $\frac{1}{2}$ the diameter of a cusp (Fig. 462d, e). Male genitalia as in Figure 462a-c.

Discussion. This is the most widely distributed member of the *dentipes* group and can usually be recognized by the characters given in the key.

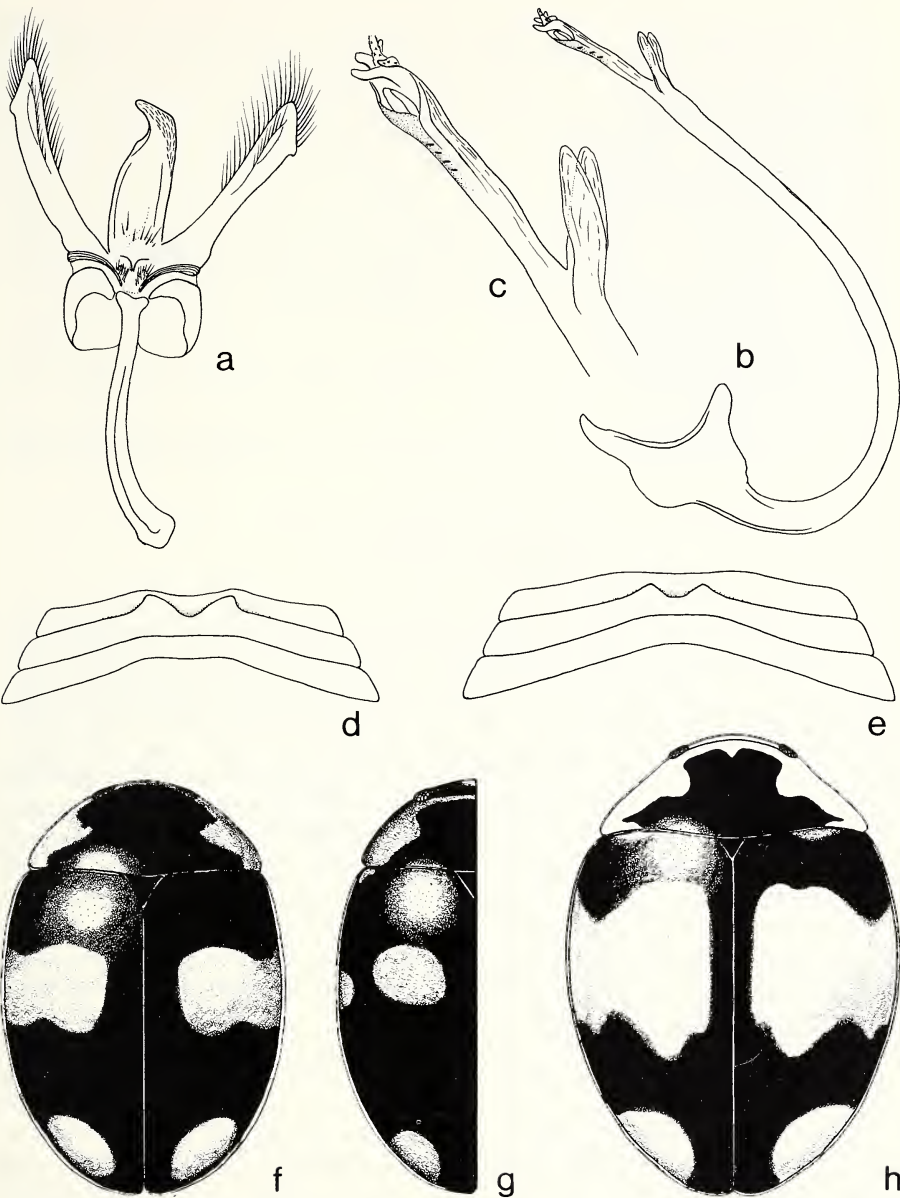


Fig. 462. *Brachiacantha dentipes*.

I must include 2 previously proposed names, *separata* and *socialis*, with *B. dentipes* because I cannot find stable characters to differentiate species or subspecies. The northern, and particularly the western specimens have noticeably more yellow or orange on the elytra than do those from Missouri, North Carolina, etc., southward. This is not constant however, occasional southern specimens are as pale as any

western specimens. The size and depth of separation of the cusps on the male 3rd abdominal sternum seem to differ. The cusps are reduced in size, and not distinctly separated in most northern and western specimen (Fig. 462e) but large and deeply separated in most southern specimens (Fig. 462d). This character also varies because specimens in long series from Mobile, Alabama, and St. Louis, Missouri, have most of the males with large cusps. A few males in each series have the small cusps characteristic of northern and western specimens. The type of *socialis* is a unique male (holotype) in the Casey collection, the type of *dentipes* is also apparently unique, but was not examined. The type of *separata* was not located; a female labeled as a paratype from southern Illinois is in the USNM collection.

Type locality. Of *dentipes*, "Habitat in Carolina"; of *socialis*, Kansas, of *separata*, Virginia.

Type depository. Of *dentipes*, ZMC; of *socialis*, USNM (35575); of *separata*, not located.

Distribution. Figure 461. New England and Ontario to Florida, west to Colorado and New Mexico.

***Brachiacantha soltau*, new species**

Fig. 463a-c; Map, Fig. 465

Description. Male, length 5.0 mm, width 3.80 mm. Form oblong, somewhat oval. Head and pronotum yellow except pronotum with small, irregular, basal brown area. Elytron black with humeral angle, median basal, and apical spot orange (Fig. 463e). Ventral surface dark brown except metepisternum yellow, leg reddish yellow, area within postcoxal line and most of abdomen yellowish brown. Punctures on head fine, dense, separated by a diameter or less; pronotal punctures coarser than on head, separated by a diameter or less; punctures on elytron equal in size to pronotal punctures, separated by less than to twice a diameter. Metasternum coarsely, densely punctured, punctures nearly contiguous laterally. Abdominal sterna coarsely, densely punctured, punctures contiguous laterally, nearly contiguous medially. Postcoxal line on first abdominal sternum rounded, area within line polished, coarsely, densely punctured; cusps on third abdominal sternum reduced, connected by arcuate ridge (Fig. 463d). Sterna 5 and 6 deeply concave medially, sternum 4 weakly concave medially. Genitalia as in Figure 463a-c.

Female, length 5.30 mm, width 4.0 mm. Similar to holotype except head black with large, median orange spot; pronotum black except large lateral area reddish yellow.

Variation. Length 5.0 to 5.30 mm, width 3.80 to 4.0 mm.

Holotype. Male. MISSISSIPPI: Southern Mississippi, June 11, 1893, Collection H. Soltau (USNM 101343).

Allotype. Female. Same data as holotype. (USNM).

Paratypes. Total 7 (Fig. 465). All with same data as holotype. (USNM).

Males of this species are easily recognized because of the nearly all yellow pronotum and reduced cusps on the third abdominal sternum. Females may be confused with females of *B. dentipes*, however, the entirely yellow or yellowish brown area within

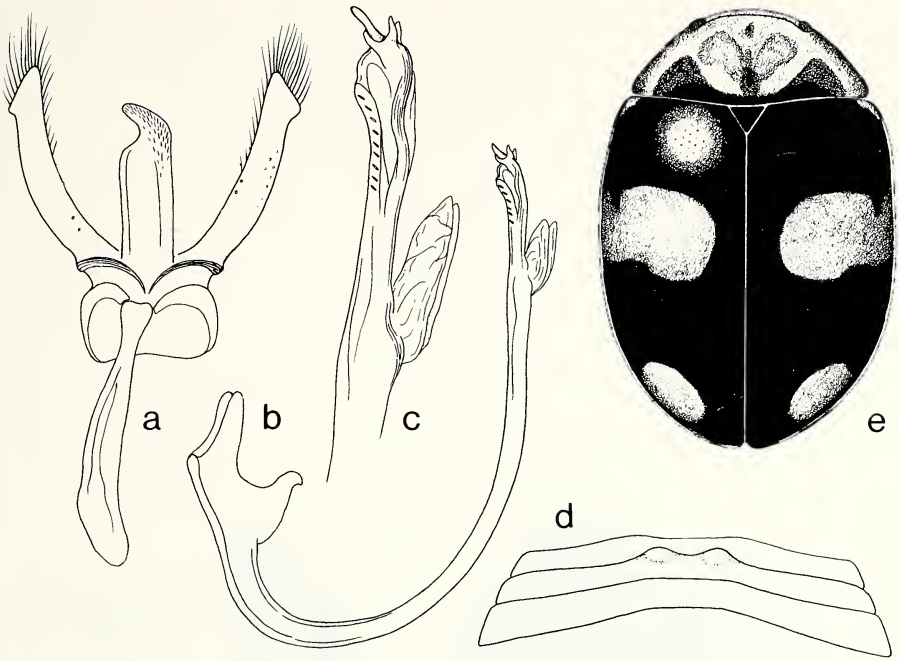


Fig. 463. *Brachiacantha soltau*.

the postcoxal line on the first abdominal sternum of *B. soltau* is a constant character in all specimens of the type series. In *B. dentipes*, the same area is usually entirely black or brown, or only partially yellowish brown. The species is named for *H. Soltau*, the collector.

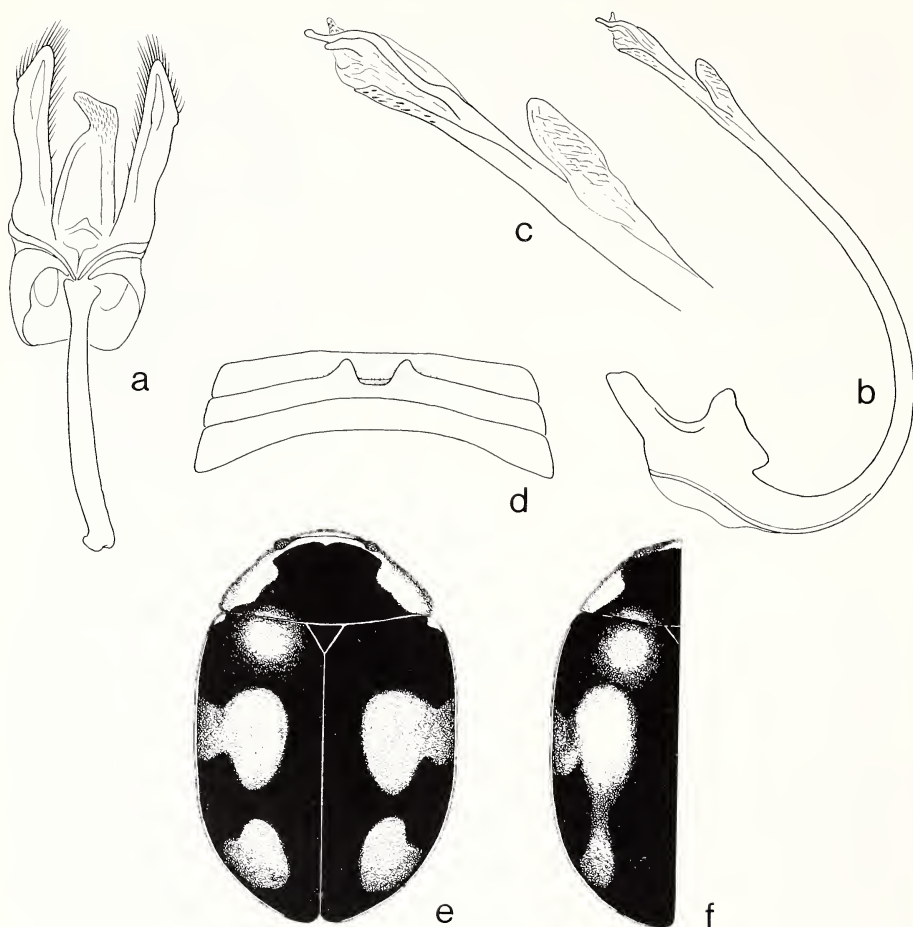


Fig. 464. *Brachiacantha blaisdelli*.

Brachiacantha blaisdelli Nunenmacher

Fig. 464a-f; Map, Fig. 465

Brachyacantha blaisdelli Nunenmacher, 1909, p. 162.—Leng, 1911, p. 304.—Leng, 1920, p. 212.—Korschevsky, 1931, p. 204.

Diagnosis. Length 4.40 to 5.0 mm, width 3.0 mm to 3.40 mm. Form oblong, narrow, elongate. Pronotum of male black except anterior margin broadly yellow, with large reddish yellow area laterally; pronotum of female black except large lateral area orange. Elytron black with orange maculation varying from a form with irregular median band and apical spot to a form with median band and apical spot obscurely connected (Fig. 464e, f). Postcoxal line angulate; male abdominal cusps widely separated, large, prominent (Fig. 464d). Male genitalia as in Figure 464a-c.

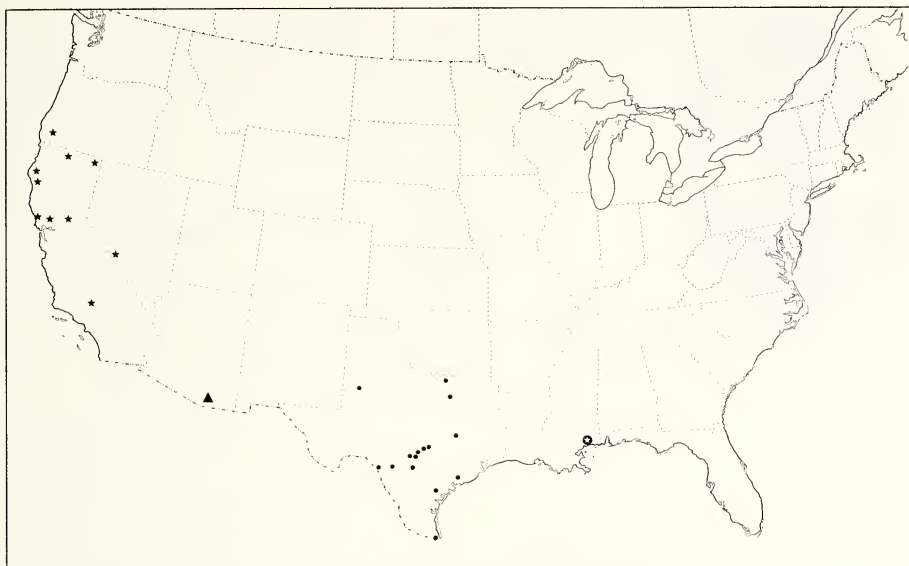


Fig. 465. Distribution. *Brachiacantha soltaui* (circled star); *B. blaisdelli* (star); *B. quadrillum* (dot); *B. stephani* (triangle).

Discussion. This species is the only member of the *dentipes* group with an extreme western distribution. The body form is more narrow and elongate than in any other member of the group. The male abdominal cusps are widely separated as in *B. tau*, but the cusps are much more prominent than those of *B. tau*. Nunenmacher (1909) stated that he had 2 type specimens, I here designate and label one of these (male) as the lectotype, the other (female) as a paralectotype.

Type locality. Goldfield, Esmeralda Co., Nevada (lectotype here designated).

Type depository. CAS.

Distribution. Figure 465. CALIFORNIA: Humboldt Co.; Mendocino Co.; Modoc Co., Lake City; Napa Co.; Sacramento Co., Galt; Siskiyou Co., Etna; Sonoma Co., Rio Nido; Tehachapi Pass. NEVADA: Esmeralda Co., Goldfield. OREGON: Grant's Pass.

Brachiacantha quadrillum LeConte

Fig. 466a–g; Map, Fig. 465

Brachiacantha quadrillum LeConte, 1858, p. 89.

Brachyacantha quadrillum: Crotch, 1873, p. 378.—Crotch, 1874b, p. 211.—Gorham, 1894, p. 186.—Leng, 1911, p. 303.—Korschefsky, 1931, p. 206.

Diagnosis. Length 3.80 to 4.75, width 2.60 to 3.50 mm. Form oval, somewhat oblong. Pronotum of male and female black with large lateral area reddish yellow. Elytron black with reddish yellow maculation varying from a form with only an apical spot to forms with an additional discal spot, or discal spot plus median lateral

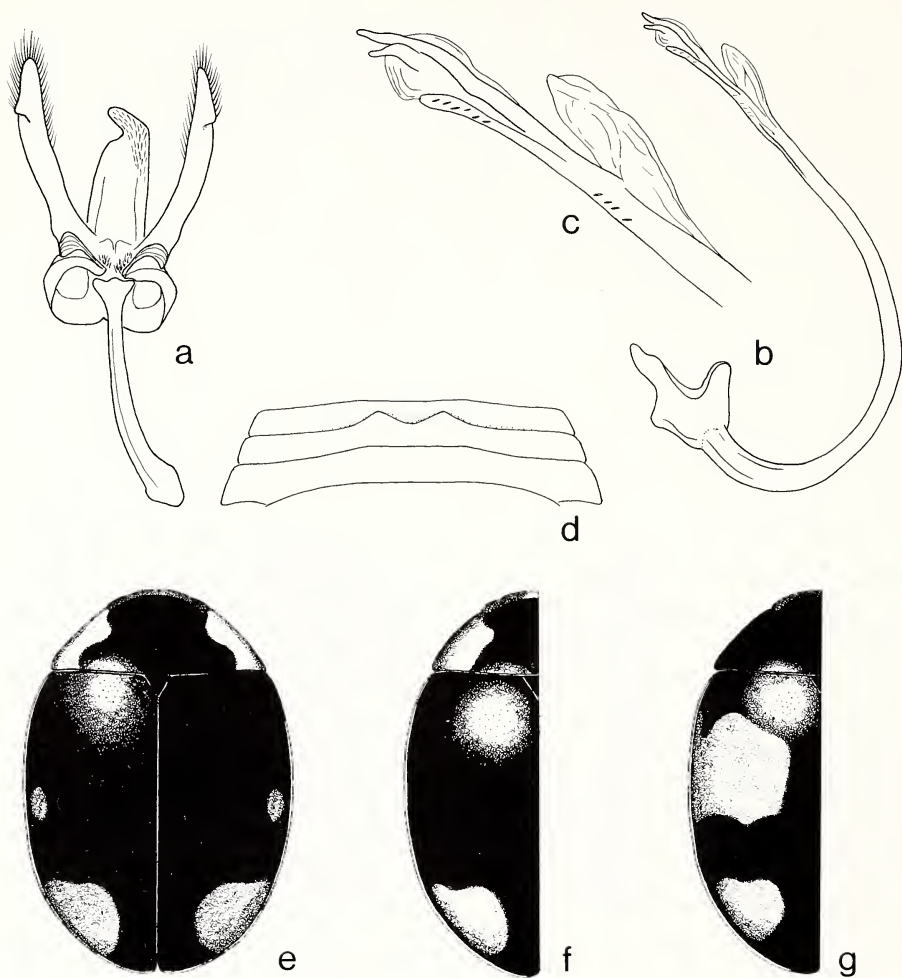


Fig. 466. *Brachiacantha quadrillum*.

spot, discal and lateral spot sometimes feebly connected (Fig. 466e-g). Postcoxal line slightly angulate; male abdominal cusps connected by a ridge triangularly depressed medially (Fig. 466d). Male genitalia as in Figure 466a-c.

Discussion. Most examples of *B. quadrillum* can be recognized by the elytral color pattern because the presence of a single apical spot on the elytron is a character not shared by other members of the group. Those specimens having additional maculation can still be recognized as *B. quadrillum* most of the time because the additional maculation is obscure and tentative in appearance. The type of *B. quadrillum* is a unique female (holotype) labeled "(red disc)"/Type 6704(red paper)/*B. quadrillum* LeC. Lindh."

Type locality. New Braunfels, Texas.

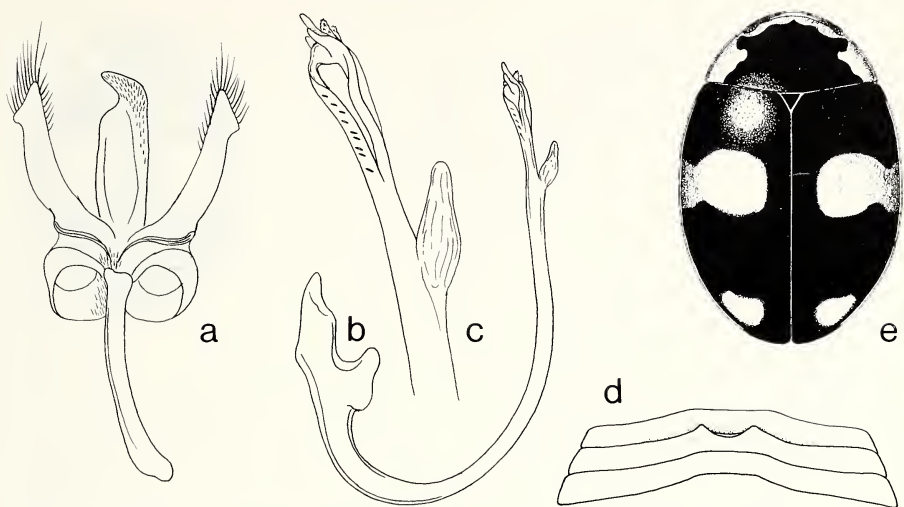


Fig. 467. *Brachiacantha stephani*.

Type depository. MCZ.

Distribution. Figure 465. TEXAS: Austin; Beeville; Brownsville; Calvert; Dallas; Del Rio; Edna; Gainesville; Hondo; Kerrville; Lubbock; New Braunfels; Sabinal; San Antonio; San Marcos.

***Brachiacantha stephani*, new species**

Fig. 467a–e; Map, Fig. 465

Description. Male, length 4.0 mm, width 2.75 mm. Form oblong, slightly oval. Head black with orange spot on vertex. Pronotum black except anterior margin narrowly yellow, small lateral area reddish yellow. Elytron black with reddish yellow apical spot and median band composed of 2 connected spots (Fig. 467e). Ventral surface black except metepisternum yellow, apex of femur, tibia, and tarsus reddish yellow. Punctures on head coarse, dense, separated by a diameter or less; pronotal punctures equal in size to head punctures, separated by one to 3 times a diameter; punctures on elytron larger than on pronotum, separated by less than twice a diameter. Metasternum densely, coarsely punctured, punctures becoming nearly contiguous laterally. Abdominal sterna densely, coarsely punctured, punctures contiguous laterally, nearly contiguous medially. Postcoxal line on first abdominal sternum slightly angulate, area within line polished, impunctate except along anterior margin of sternum; cusps on third sternum not reduced, separated by more than the width of a cusp (Fig. 467d); sternum 4 weakly concave medially, sternum 5 slightly more concave than sternum 4, sternum 6 flat, lacking median depression. Genitalia as in Figure 467a–c.

Female, length 4.5 mm, width 3.0 mm. Similar to holotype except pronotum black on anterior margin, yellowish red lateral area larger.

Variation. Length 4.0 to 4.80 mm, width 2.75 to 3.20 mm. The median band on

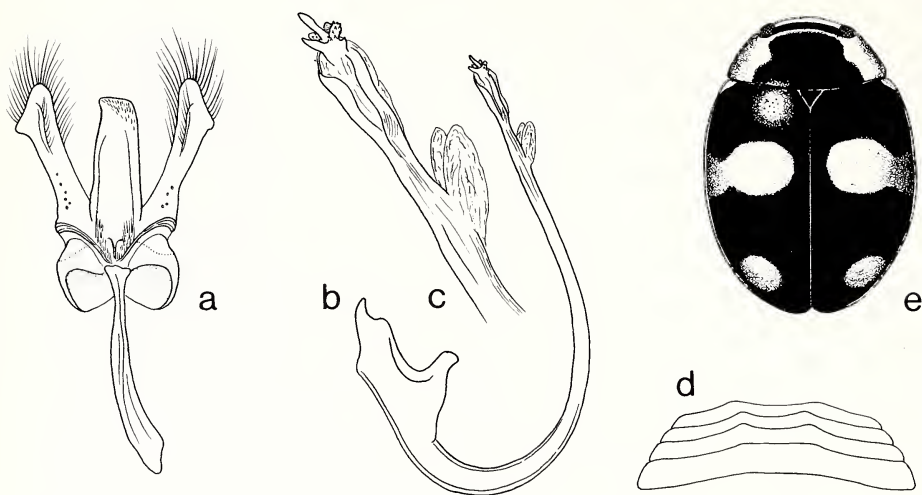


Fig. 468. *Brachiacantha barberi*.

each elytron may not be partially divided, therefore does not appear to be composed of 2 connected spots.

Holotype. Male. ARIZONA: Santa Rita Mts., Madera Canyon, 26 Aug. 1970, K. Stephan Coll (FSCA).

Allotype. Female. Same data as holotype. (FSCA).

Paratypes. Total 5 (fig. 465). ARIZONA: Santa Rita Mts., Madera Cyn., July 21, 1969; same data except dates Aug. 3, Aug. 18, 1968, and July, 1970. (FSCA) (USNM).

The head of the male is not entirely yellow in *B. stephani*, a character which will separate that sex from *B. tau* and *B. subfasciata*, the other species of this group occurring in Arizona. Females of *B. stephani* and *B. tau* are not easily separated; in fact I have not found any character that will accomplish this. This species is named for Karl Stephan, the collector of part of the type series and an avid Coleopterist.

***Brachiacantha barberi*, new species**

Fig. 468a-e; Map, Fig. 469

Description. Male, length 3.30 mm, width 2.50 mm. Form oval, slightly rounded. Head yellow. Pronotum black except wide anterior border and large lateral area reddish yellow. Elytron black with yellow apical spot, median band, and small humeral spot, median band composed of 2 connected spots (Fig. 468e). Ventral surface black except metepisternum yellow, leg reddish yellow, abdomen yellowish brown except median $\frac{1}{3}$ of first 2 abdominal sterna black. Punctures on head extremely fine, barely perceptible; pronotal punctures coarse, dense, separated by a diameter or less; punctures on elytron equal in size to pronotal punctures, separated by one to 2 times a diameter. Metasternum coarsely, densely punctured, punctures separated by a diameter medially, becoming coarser and contiguous laterally. Abdominal sterna

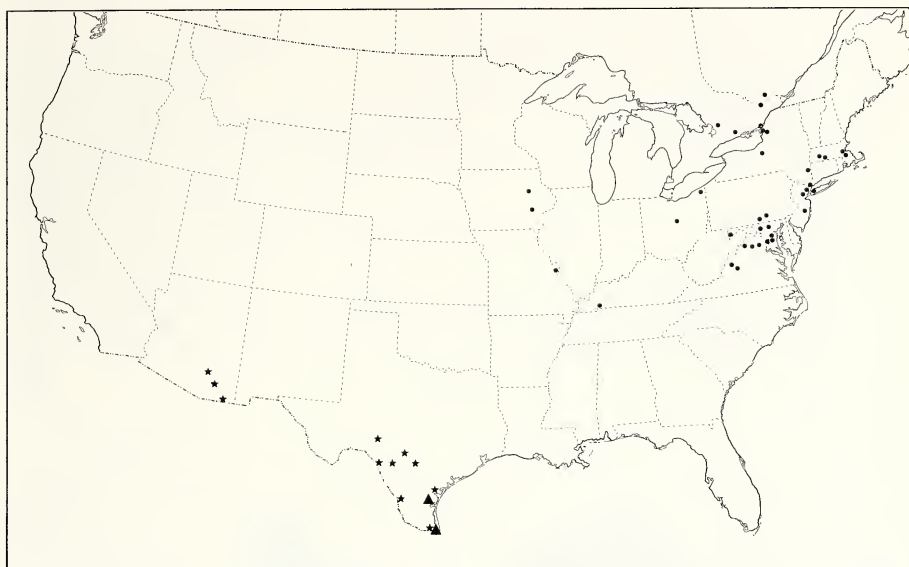


Fig. 469. Distribution. *Brachiacantha barberi* (triangle); *B. subfasciata* (star); *B. rotunda* (dot).

feebly, sparsely punctured medially, punctures becoming coarse, contiguous laterally. Postcoxal line on first abdominal sternum rounded, area within line smooth, sparsely punctured; cusps on 3rd sternum extremely reduced, separated by the width of a cusp (Fig. 468d); sternum 4 with cusps nearly equal in size to those on sternum 3; sternum 5 feebly depressed medially, sternum 6 flat, not depressed medially. Genitalia as in Figure 468a–c.

Female, length 3.10 mm, width 2.30 mm. Similar to male except clypeus and lateral margin of frons brown; abdomen mostly yellowish brown except median $\frac{1}{3}$ of first sternum black.

Variation. Length 2.85 to 3.40 mm, width 2.10 to 2.60 mm. One type specimen has the median band on the elytron nearly straight, not appearing as 2 connected spots; abdomen is often almost entirely yellowish brown, the median area of the first sternum brown or dark brown.

Holotype. Male. TEXAS: Corpus Christi, 4/29/96, Marlatt (USNM 101344).

Allotype. Female. TEXAS: Brownsville, 18.24.V.04, HS Barber collector. (USNM).

Paratypes. Total 6 (Fig. 469). TEXAS: Brownsville, 1.VI.04, H.S. Barber collector; Brownsville, VI.25–30, J. O. Martin, collector; Esprza (Esperanza) Rch, Brownsville, VIII.23; Kingsville, C.T. Reed coll.; Macdona, VII-29, J.W. Green, collector. (CAS) (USNM).

The only species known to occur in south Texas with which *B. barberi* might be confused is *B. subfasciata*, see remarks under that species. This species is named for H. S. Barber.

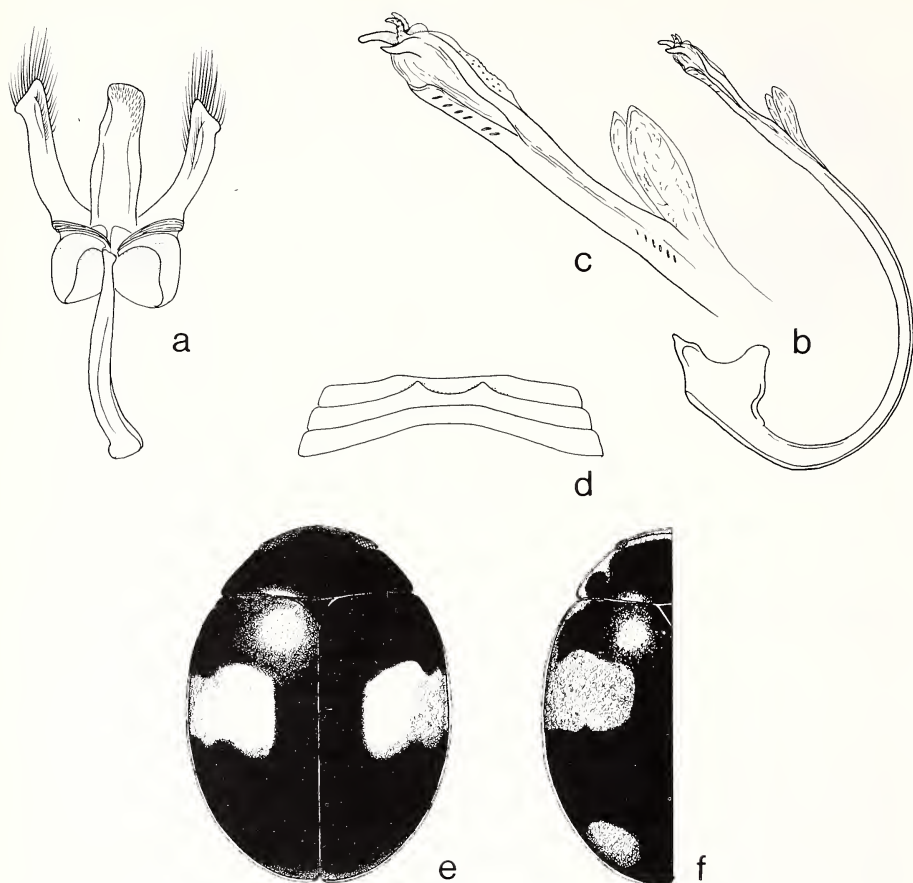


Fig. 470. *Brachiacantha subfasciata*.

Brachiacantha subfasciata Mulsant

Fig. 470a-f, Map, Fig. 469

Brachyacantha subfasciata Mulsant, 1850, p. 527.—Crotch, 1874b, p. 211.—Gorham, 1894, p. 187.—Leng, 1911, p. 302.—Leng, 1920, p. 212.—Korschevsky, 1931, p. 207.

Diagnosis. Length 3.50 to 4.00 mm, width 2.60 to 3.0 mm. Form oblong, slightly oval. Pronotum of male black with narrow anterior margin and narrow area on anterolateral angle yellow; female pronotum entirely black or with very small yellow area on anterolateral angle. Elytron usually black except a median orange band present (Fig. 470e), south Texas specimens with additional apical spot (Fig. 470f). Postcoxal line slightly angulate; male abdominal cusps widely separated (Fig. 470d). Male genitalia as in Figure 470a-c.

Discussion. The typical form occurs in Arizona and is recognizable by the dorsal

color pattern. The south Texas specimens have an additional apical spot on each elytron, resembling *H. barberi*. However, *H. barberi* is consistently smaller and more rounded in body form. Two type specimens were found in the Paris Museum, a male in the general collection, and a female in the Sicard collection. The male labeled "Museum Paris/143/*Brachyacantha subfasciata* Muls., auct. det." is here designated and labeled the lectotype. The female labeled "Coll. Mnischez/Mexique" is designated a paralectotype.

Type locality. "Mexique" (lectotype here designated).

Type depository. PM.

Distribution. Figure 469. ARIZONA: Cochise Co., Douglas; Pima Co., Pantano; Sta. Catalina Mts., Molino Basin. TEXAS: Brownsville; Crockett Co., Ozona; Del Rio; Kerrville; San Antonio; Sinton, Welder Wildlife Res.; Uvalde; Webb Co., Laredo.

ursina group

Anterior tibia not noticeably flanged, or if so, then flange not arcuate, widest at middle or just before tibial excavation (Fig. 458b); abdomen of male without cusps on 3rd sternum (Fig. 458d), 5th sternum modified; basal lobe of male genitalia symmetrical, apically truncate (Fig. 471a), siphon with fan-like membranous lobes (Fig. 472c).

The *ursina* group contains all of the species in Leng's (1911) Group 4 except *B. indubitabilis*. I also include *B. querceti* from Leng's Group 6 because the male genitalia are of the *B. ursina* type.

***Brachiacantha rotunda*, new species**

Fig. 471a-d; Map, Fig. 469

Description. Male, length 3.50 mm, width 2.70 mm. Form round. Head yellow except clypeus yellowish brown. Pronotum black except narrow anterior margin and apical angle yellow. Elytron black with 5 yellow spots (Fig. 471d). Ventral surface black to dark brown except mouthparts, tibia, and tarsus yellow. Clypeus narrow, anterior angle rounded. Punctures on head fine, separated by one to 3 times a diameter; pronotal punctures coarser than on head, separated by a diameter or less; punctures on elytron slightly coarser than on pronotum, separated by less than to slightly more than a diameter. Metasternum coarsely punctured, punctures sparse medially, nearly contiguous laterally. Abdominal sterna finely punctured, punctures sparse medially, contiguous laterally. Postcoxal line on first abdominal sternum rounded, area within line alutaceous, sparsely, coarsely punctured; median depression of 4th and 5th sterna feeble. Genitalia as in Figure 471a-c.

Female, length 3.80 mm, width 2.0 mm. Similar to holotype except yellowish brown area on clypeus enlarged, vertex black, narrow margin beside eye yellowish brown; pronotum with anterior margin black.

Variation. Length 3.10 to 4.0 mm, width 2.20 to 3.0 mm.

Holotype. Male. VIRGINIA: Massanutten Mt., Sept. 21, 1941, E. A. Chapin (USNM 101345).

Allotype. Female. VIRGINIA: same data as holotype. (USNM).

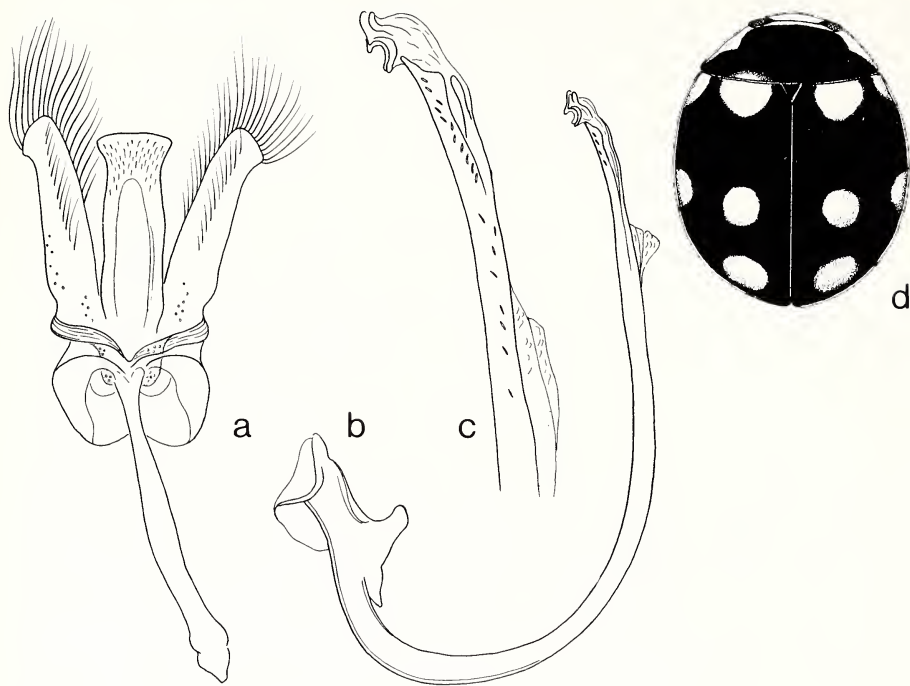


Fig. 471. *Brachiacantha rotunda*.

Paratypes. Total 54 (Fig. 469). ONTARIO: Aubrey Island, St. Lawrence Is. National Park, Sept. 15, 1976, Oct. 2, 1976, W. Reid; Bell's Corners, VI-7-1950, S.D. Hicks; Hastings, 8 May-01, Evans; Miners Bay, 26-V-1931, G. S. Walley; Ridgeway, 5/30/91, E.P.U. Coll; St. Lawrence Is. National Park, Grenadier I., Centre, 2-9:VII: 1975, Sigler; Thwartway Island, St. Lawrence Is. National Park, Sept. 9, 1976, W. Reid. QUEBEC: Aylmer, 18-V-1934, W. J. Brown. DISTRICT OF COLUMBIA: Washington, 5-IV, H. S. Barber. IOWA: Independence, V-15, Wickham; Iowa City, 5-30-16, L. Buchanan. KENTUCKY: Cadiz, May 24, 1954, K. Stephan. MARYLAND: Beltsville, VIII-21-1958, H. P. Lanchester; S. Mts. near Myersville, Sept. 2, 15; Oakland, V-24-1942, Dieke; Westminster, V-15-1940, Dieke. MASSACHUSETTS: Blue Hills, W. M. Mann; Mt. Tom; Springfield, 14 May, 1919, Geo Dimmock; Tyngsboro, VIII-II-14. MISSOURI: Webster Groves, 6-10-31. NEW JERSEY: Big Timber Cr., 11-19-1900; Towaco, VI-19-43, A. Nicolay; Lakehurst, 9/1/07, V-30-25; Midvale, VIII-30-42, A. Nicolay. NEW YORK: Bangall, IX-17-13, G. P. Engelhardt; Buffalo, 6-5-87, E.P.V. coll; Buffalo, 22 July 1933, J. G. Franclemont; "Cent."; Ithaca, 12 May 1937, 1938, J. G. Franclemont; Lancaster, 5/20/89, E.P.V. coll; L. I. Yaphank VIII-13-10; West Point, May 30, 1909, Oct. 10, 1909, May 8, 1910, Sept. 15, 1915, W. Robinson. OHIO: Jefferson, R. J. + M. B. Sim; Knox Co., IX-18-1940. PENNSYLVANIA: Dauphin Co., VI-5-27, J. N. Knull; Mt. Holly Spgs., IX-1-1918. VIRGINIA: Top Mt. Elliott, Augusta Co., 4473 ft., 20-6-34, H. A. Allard; Edinburgh, IX-13-1945, Dieke; Fava. Co., Belvoir, VI-2-1940, Dieke; Glencarlyn,

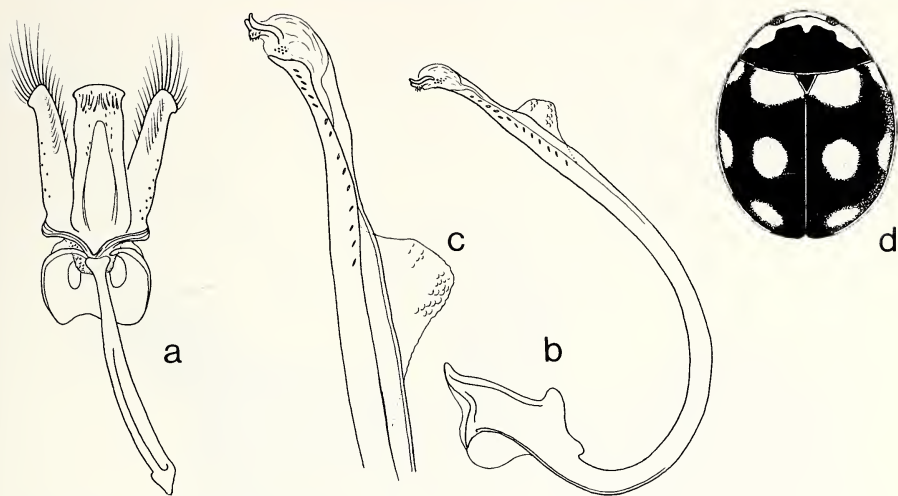


Fig. 472. *Brachiacantha felina*.

IX-14, 19, H. F. Wickham; same as type data; Nelson Co., Aug. 7, 1910, W. Robinson. (CAS) (CNC) (FSCA) (USNM).

In addition to the key characters, the clypeus with rounded anterior angles and darkened surface are of help in distinguishing *B. rotunda* from *B. ursina* with which it is most likely to be confused. Males of *B. ursina* nearly always have the head, including the clypeus, entirely yellow, and the clypeal angles are abrupt in both sexes. It is surprising that *B. rotunda* should have remained undetected after both Casey and Leng worked on *Brachiacantha*, particularly in view of the very noticeable difference in body shape. The specific epithet refers to the round body form.

Brachiacantha felina (F.)

Fig. 472a-d; Map, Fig. 473

Coccinella felina F., 1775, p. 87.—Fabricius, 1781, p. 106.—Fabricius, 1787, p. 61.—Fabricius, 1792, p. 290.—Fabricius, 1801, p. 385.—Olivier, 1791, p. 79.

Brachyacantha felina: Mulsant, 1850, p. 1046.—Crotch, 1873, p. 377.—Crotch, 1874b, p. 307.—Leng, 1911, p. 312.—Korschefsky, 1931, p. 205.—Wingo, 1952, p. 27.—J. Chapin, 1974, p. 45.

Brachiacantha fulvopustulata Melsheimer, 1847, p. 178.

Brachyacantha fulvopustulata: Crotch, 1874b, p. 43.—Leng, 1911, p. 312.

Brachyacantha felina var. *fulvopustulata*: Korschefsky, 1931, p. 205.

Diagnosis. Length 2.20 to 3.0 mm, width 1.65 to 2.50 mm. Form round. Pronotum of male black with anterior margin and anterolateral angle yellow, apex of black area irregular, slightly emarginate at middle; female pronotum usually black except anterolateral angle yellow, often with narrow, yellow, anterior border. Elytron black with 5 yellow spots (Fig. 472d). Postcoxal line rounded. Male genitalia as in Figure 472a-c.

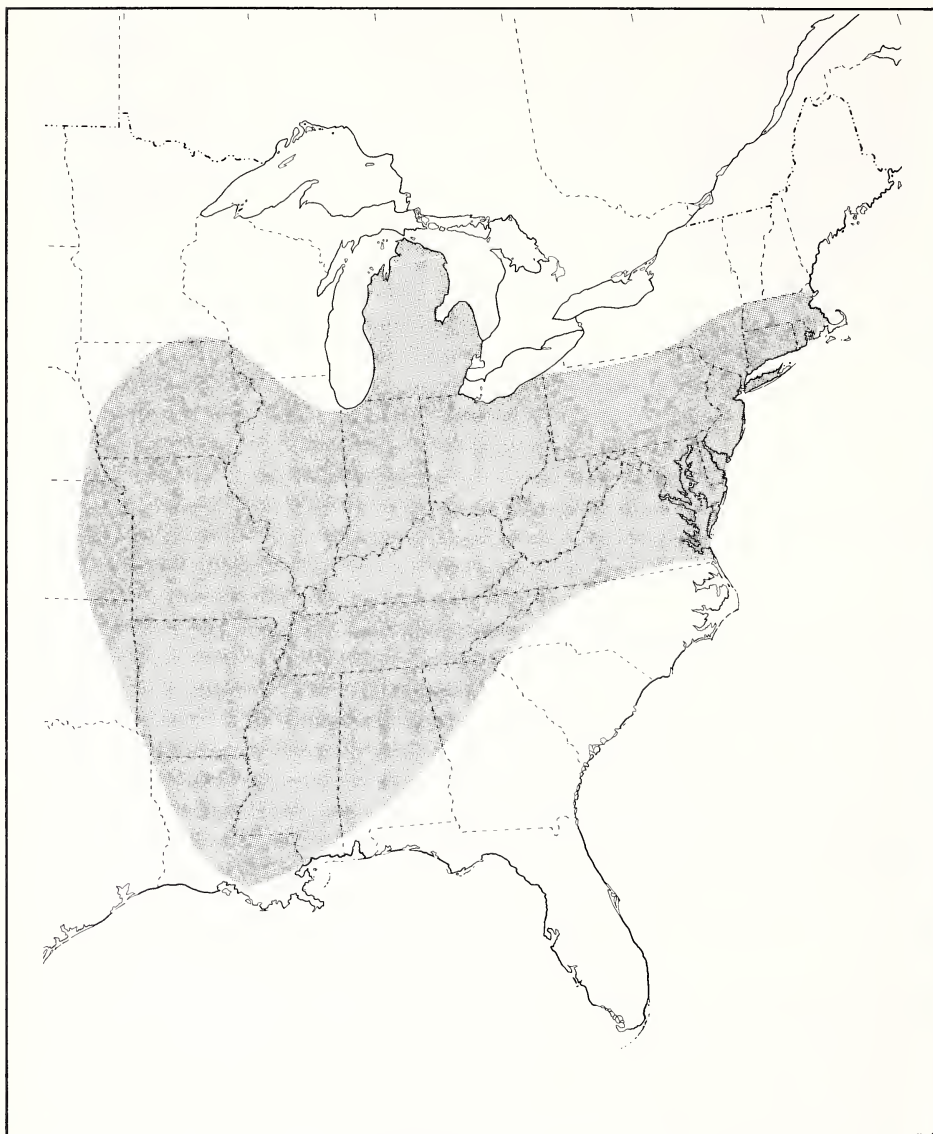


Fig. 473. Distribution. *Brachiacantha felina*.

Discussion. The round form of this species causes it to resemble *B. rotunda*, but there is a distinct size differential between these species, as well as a difference in the male pronotal color patterns as indicated in the key to species. A specimen in the LeConte collection is labeled "Melsh. fulvopustulata/(ragged red paper)", but I do not consider it a type because it has 5 spots on each elytron. Melsheimer specifically stated that his type had 4 spots on each elytron.

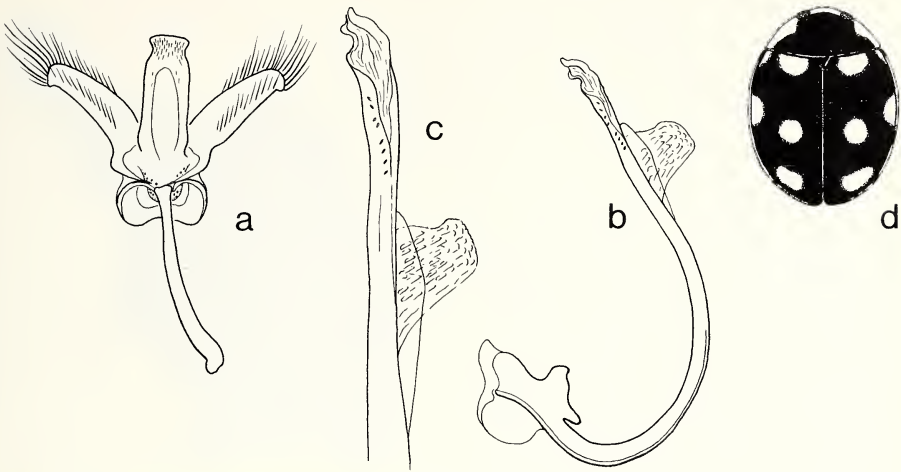


Fig. 474. *Brachiacantha decempustulata*.

Type locality. Of *felina*, "Amer. bor." (type not examined); of *fulvopustulata*, Pennsylvania.

Type depository. Of *felina*, not located; of *fulvopustulata*, not located.

Distribution. Figure 473. Massachusetts to North Carolina, west to Iowa and Louisiana.

Brachiacantha decempustulata (Melsheimer)

Fig. 474a–d; Map, Fig. 475

Hyperaspis 10-pustulata Melsheimer, 1847, p. 179.

Brachiacantha 10-pustulata: LeConte, 1852, p. 133.

Brachyacantha 10-pustulata: Mulsant, 1856, p. 149.—Crotch, 1873, p. 378.—Crotch, 1874b, p. 211.—Wickham, 1894, p. 304.—Casey, 1899, p. 117.—Blatchley, 1910, p. 520.—Korschefsky, 1931, p. 205.

Brachyacantha felina 10-pustulata: Leng, 1911, p. 313.

Brachyacantha ursina var. *troglydytes* Mulsant, 1850, p. 534. **New Synonymy.**

Brachyacantha stellata ab. *troglydytes*: Korschefsky, 1931, p. 207.

Brachyacantha stellata Casey, 1899, p. 117.—Blatchley, 1910, p. 520.—Korschefsky, 1931, p. 207.—Belicek, 1976, p. 317.

Brachyacantha ursina stellata: Leng, 1911, p. 310.

Diagnosis. Length 2.0 to 2.50 mm, width 1.60 to 2.0 mm. Description as for *felina* except form oval; spots on elytron smaller (Fig. 474d); male genitalia as in Figure 474a–c.

Discussion. In addition to the key characters and reduced size of the elytral spots, this species also has sparse elytral punctures that are usually separated by more than the diameter of a puncture, whereas in *B. felina* and *B. rotunda* they are usually separated by a diameter or less. Melsheimer (1847) had a single type specimen of *B. decempustulata* which is now in the LeConte collection labeled "Melsh./10 pustu-

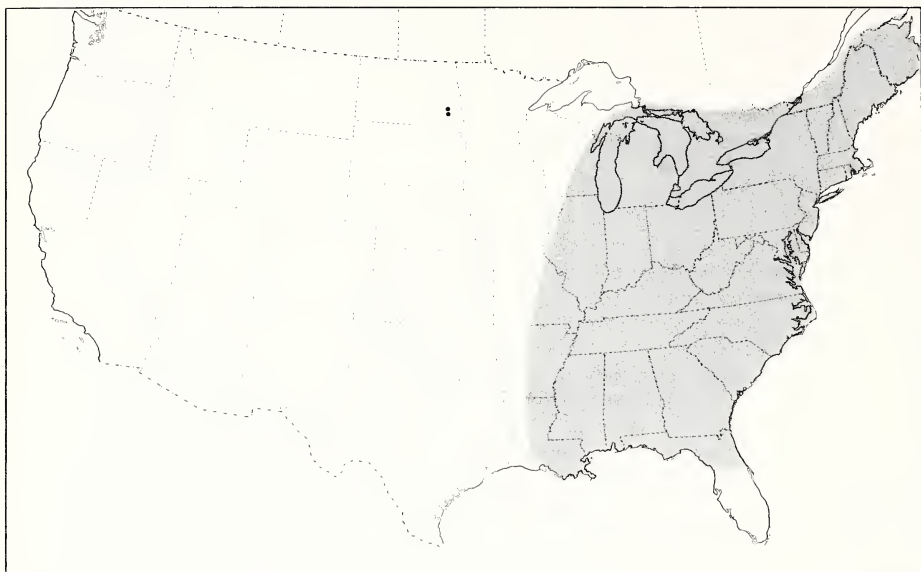


Fig. 475. Distribution. *Brachiacantha decempustulata* (shaded, disjunct localities dotted).

lata". A single female type of *B. troglodytes* labeled "Amer. bor., Mannerheim" is here designated and labeled as the lectotype. There are 2 female types of *B. stellata* in the Casey collection. The first of these is here designated and labeled as the lectotype, the other specimen as a paralectotype.

Type locality. Of *decempustulata*, Pennsylvania; of *troglodytes*, "Amer. bor." (lectotype here designated); of *stellata*, Indiana (lectotype here designated).

Type depository. Of *decempustulata*, MCZ; of *troglodytes*, DLM; of *stellata*, USNM (35567).

Distribution. Figure 475. New Brunswick and Nova Scotia to Florida, west to Wisconsin and Louisiana. Disjunct localities; Barnes Co., Baldhill Dam, and Griggs Co., North Dakota.

Brachiacantha ursina (F.)

Fig. 476a-f; Map, Fig. 477

Coccinella ursina F., 1787, p. 61.—1792, p. 291.—1801, p. 386.—Olivier, 1791, p. 80.

Brachyacantha ursina: Mulsant, 1850, p. 532.—Crotch, 1873, p. 378.—Wickham, 1894, p. 304.—Casey, 1899, p. 117.—Blatchley, 1910, p. 520.—Leng, 1911, p. 309.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 207.—Wingo, 1952, p. 27.—J. Chapin, 1974, p. 45.—Belicek, 1976, p. 317 (in part).

Brachyacantha congruens Casey, 1899, p. 117.—Blatchley, 1910, p. 520.—Belicek, 1976, p. 317.

Brachyacantha ursina congruens: Leng, 1911, p. 310.

Brachyacantha ursina ab. *congruens*: Korschefsky, 1931, p. 207.

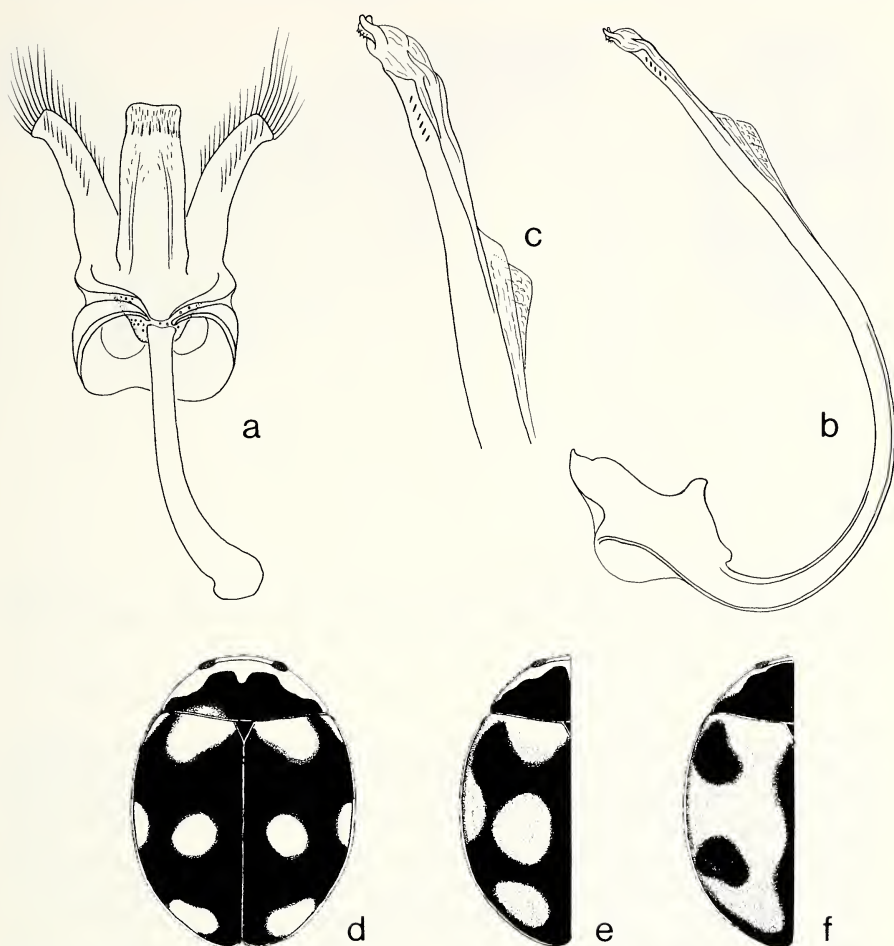


Fig. 476. *Brachiacantha ursina*.

Diagnosis. Length 3.0 to 4.0 mm, width 2.10 to 2.80 mm. Form elongate oval. Pronotum of male black except anterior margin and anterolateral angle broadly yellow, apical margin of black area indented. Elytron usually with 5 yellow spots (Fig. 476d), specimens from Iowa and Minnesota often with spots partially confluent (Fig. 476e, f). Postcoxal line rounded. Male genitalia as in Figure 476a–c.

Discussion. This is the most commonly collected eastern species of *Brachiacantha*, but the dorsal color pattern is remarkably uniform. There is a tendency for the elytral spots to become somewhat confluent in upper midwest specimens, but, if anything, these specimens are more easily recognizable than the typical form because no other species occurring in that region has a similar appearance. The combination of large size (3.0 to 4.0 mm long) and elongate, oval body form will separate *ursina* from other eastern *Brachiacantha* having the same color pattern. I agree with Belicek

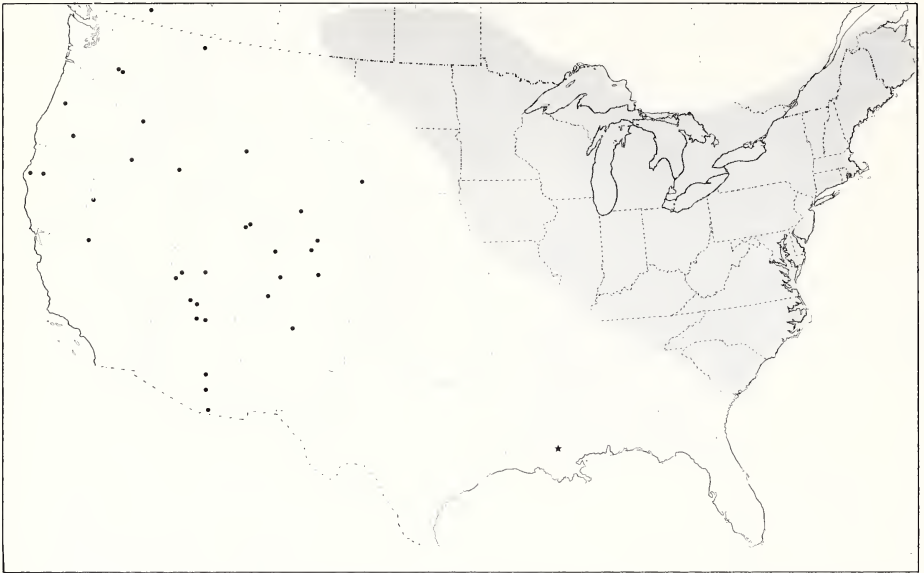


Fig. 477. Distribution. *Brachiacantha ursina* (shaded, disjunct locality starred); *B. uteella* (dot).

(1976) who placed *congruens* Casey as a synonym of *ursina*. There are 7 types of "congruens" in the Casey collection, however, 4 of these are actually *felina*. I here designate and label a male in the type series as the lectotype, the remaining 3 examples of *congruens* as paralectotypes.

Type locality. Of *ursina*, "America boreali" (type not examined); of *congruens*, Hot Spring, French Broad River, North Carolina. (lectotype here designated).

Type depository. Of *ursina*, not located; of *congruens*, USNM (35568).

Distribution. Figure 477. Nova Scotia to South Carolina, west to Manitoba and Iowa.

Brachiacantha uteella Casey

Fig. 478a-d; Map, Fig. 477

Brachyacantha uteella Casey, 1908, p. 412.—Belicek, 1976, p. 317.

Brachyacantha ursina uteella: Leng, 1911, p. 310.—Leng, 1920, p. 212.

Brachyacantha stellata ab. *uteella:* Korschefsky, 1931, p. 208.

Brachyacantha uteella sonorana Casey, 1908, p. 413.—Belicek, 1976, p. 317.

Brachyacantha ursina sonorana: Leng, 1911, p. 311.—Leng, 1920, p. 212.

Brachyacantha ursina ab. *sonorana:* Korschefsky, 1931, p. 207.

Brachyacantha fenyesi Leng, 1911, p. 316.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 205. **New Synonymy.**

Brachyacantha lengi Nunenmacher, 1912, p. 449.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 205. **New Synonymy.**

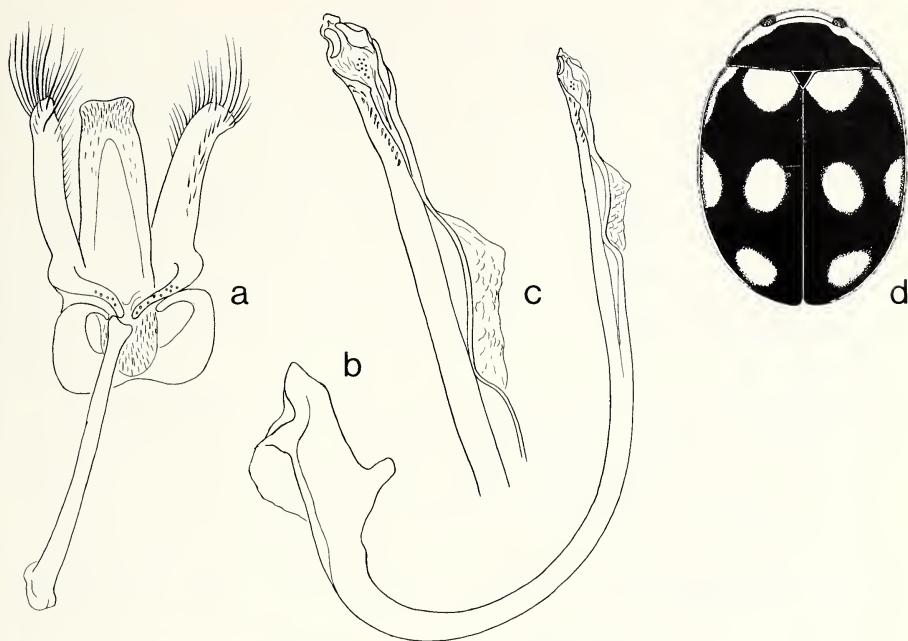


Fig. 478. *Brachiacantha uteella*.

Diagnosis. Length 2.60 to 4.60 mm, width 2.0 to 3.40 mm. Form elongate oval. Pronotum of male black except anterior margin and anterolateral angle broadly yellow, apical margin of black area indented. Color pattern on elytron variable, typical form black with 5 yellow spots (Fig. 478d), basal spot often faint, or spots expanded, partially confluent. Postcoxal line rounded. Male genitalia as in Figure 478a–c.

Discussion. I regard *B. uteella* as a valid species, widespread and variable in western North America. Leng (1911) and Belicek (1976) considered *uteella* a subspecies of *B. ursina*. I have not seen intergrade material between the 2, and they are widely separated geographically, therefore it seems logical to accord each specific rank. The unique female type (holotype) of *sonorana* Casey is not separable from examples of *uteella* from Arizona and Utah, therefore I regard *sonorana* to be a junior synonym of *uteella*. Both *fenyesi* Leng and *lengi* Nunenmacher are apparently inseparable from *uteella*, and I also consider them as junior synonyms. Leng (1911) listed 3 Colorado localities from which he had type specimens. I can locate only one male from any of these localities labeled "Glenwood Spgs., Col./July/Chas. W. Leng collection/U.S.N.M. paratype 40413 (red paper)" which I here designate and label as the lectotype. Within the known geographic range, the only species with which *B. uteella* might be confused is *B. albifrons*. The darkest color forms of *B. albifrons* and the lightest forms of *B. uteella* may have very similar color patterns, however *B. albifrons* is a narrowly oval species with weakly rounded sides and *B. uteella* is a broader species with more strongly rounded sides. They are mostly allopatric with some overlap (Fig. 477).

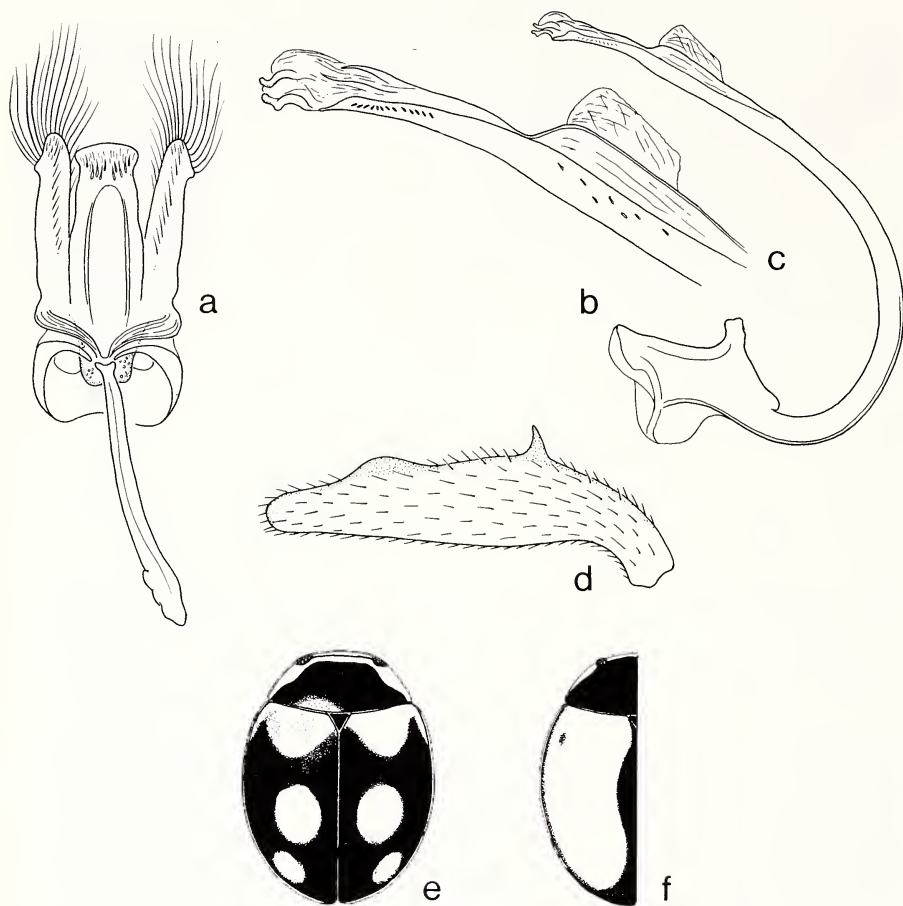


Fig. 479. *Brachiacantha arizonica*.

Type locality. Of *uteella*, Milford, Utah; of *sonorana*, Colonia Garcia, Chihuahua, Mexico; of *fenyesi*, Glenwood Springs, Colorado (lectotype here designated); of *lengi*, Weitchpee, Humboldt Co., California.

Type depository. Of *uteella* (35569) and *sonorana* (35570), USNM; of *fenyesi*, USNM (40413), of *lengi*, CAS.

Distribution. Figure 477. BRITISH COLUMBIA: Osoyoos, Richter Pass. ARIZONA: Bright Angel; Coconino Co.; Flagstaff; Huach. Mts.; Pinal Mts.; Tucson; Williams. CALIFORNIA: Lundy; Trinity Co., Carrville. COLORADO: Boulder; Colorado Springs; Durango; Estes Park; Glenwood Springs; Gunnison; Muckanawago. IDAHO: Murtaugh. MONTANA: Kalispell. NEVADA: Washoe Co., Gerlach. NEW MEXICO: Santa Fe. OREGON: Corvallis; Crater Lake; Harney Co.; Huntington. SOUTH DAKOTA: Oglala, White River. UTAH: Bicknell; Milford; Pinto; Roosevelt; Vernal. WASHINGTON: Naches River; Yakima Co., Satus Creek. WYOMING: Carbon Co.; Grand Teton Pk.

Brachiacantha arizonica Schaeffer

Fig. 479a–f; Map, Fig. 481

Brachyacantha arizonica Schaeffer, 1908, p. 125.—Leng, 1911, p. 314.—Leng, 1920, p. 212.—Korschfsky, 1931, p. 203.

Diagnosis. Length 2.90 to 3.60 mm, width 2.30 to 2.75 mm. Form round. Pronotum of male with broad anterior margin and anterolateral angle yellow; female pronotum similar to male except yellow anterior border and anterolateral angle reduced. Elytron typically black with 4 yellow spots, basal and humeral spot confluent (Fig. 479e); pattern variable, often with trace of 5th spot on lateral margin, or all spots confluent (Fig. 479f). Anterior tibia with prominent tooth on outer margin near tarsal insertion, tooth angled inward (Fig. 479d). Postcoxal line rounded. Male genitalia as in Figure 479a–c.

Discussion. I have seen this species only from Arizona. The round form, confluent humeral and basal spots, and unique form of the outer anterior tibial tooth characterize *B. arizonica*. There are 7 type specimens of *B. arizonica*; I here designate and label a male as the lectotype, the remaining 6 as paralectotypes.

Type locality. Huachucha Mts., Arizona (lectotype here designated).

Type depository. USNM (42552).

Distribution. Figure 481. ARIZONA: Cochise Co., Chiricahua Mts.; Palmerlee; Flagstaff; Oak Creek; Globe; Greenlee Co.; Huachucha Mts.; Santa Rita Mts.; Tucson.

Brachiacantha testudo Casey

Fig. 480a–d; Map, Fig. 481

Brachyacantha testudo Casey, 1899, p. 118.—Bowditch, 1902, p. 206.—Leng, 1911, p. 312.—Korschefsky, 1931, p. 207.

Diagnosis. Length 2.25 to 3.30 mm, width 1.75 to 2.50 mm. Form rounded, slightly oval. Male pronotum black except apical margin and anterolateral angle yellow; female pronotum similar to male except anterior margin narrowly yellow. Elytron black or brown with 5 yellow spots (Fig. 480d), spots sometimes partially confluent. Postcoxal line slightly angulate. Male genitalia as in Figure 480a–c.

Discussion. The rounded form, 5 spots on each elytron, and extreme south Texas distribution make correct identification of this species easy. There are 2 female types of *B. testudo* in the Casey collection, and I here designate and label one as the lectotype, the other as a paralectotype.

Type locality. Brownsville, Texas (lectotype here designated).

Type depository. USNM (35571).

Distribution. Figure 481: TEXAS: Brownsville; Cameron Co.; Pt. Isabel. San Antonio; Uvalde Co., Uvalde.

***Brachiacantha schwarzi*, new species**

Fig. 482a–d; Map, Fig. 481

Description. Male, length 3.0 mm, width 2.40 mm. Form round. Head yellow. Pronotum black except anterior margin and anterolateral angle yellow, apical margin of black area uneven. Elytron black except 2 yellow, fused spots occupying basal ½, large apical spot present (Fig. 482d). Ventral surface black except leg yellow, 6th and

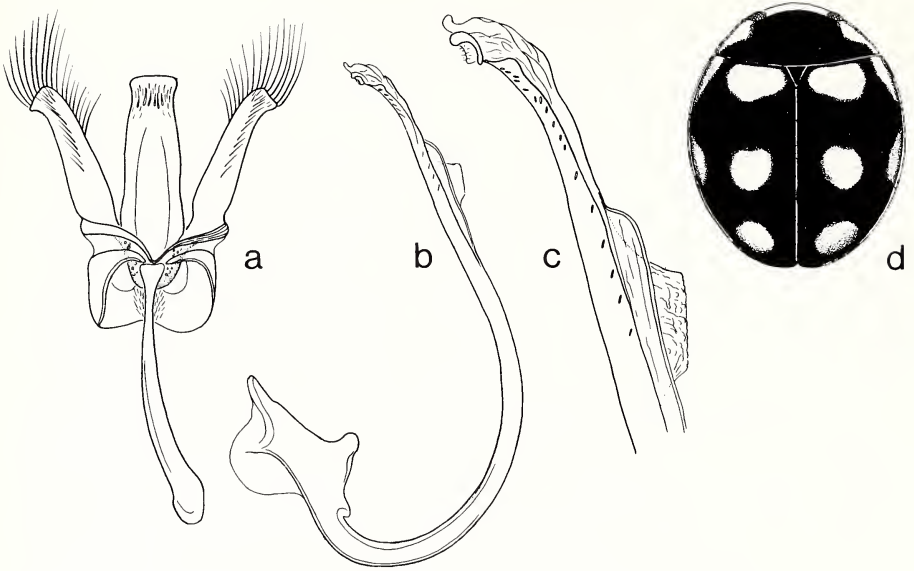


Fig. 480. *Brachiacantha testudo*.

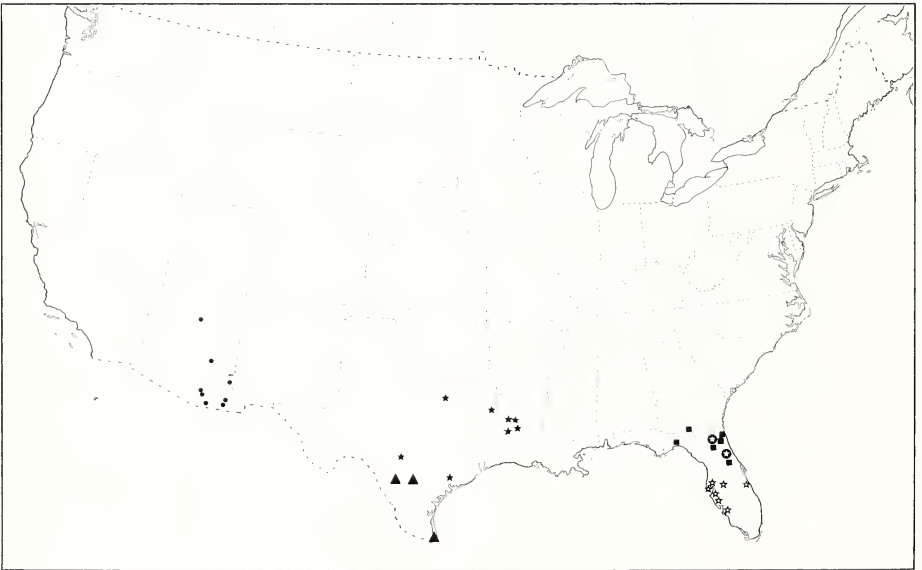


Fig. 481. Distribution. *Brachiacantha arizonica* (dot); *B. testudo* (triangle); *B. schwarzi* (square); *B. querceti* (open star); *B. floridensis* (circled star); *B. bollii* (star).

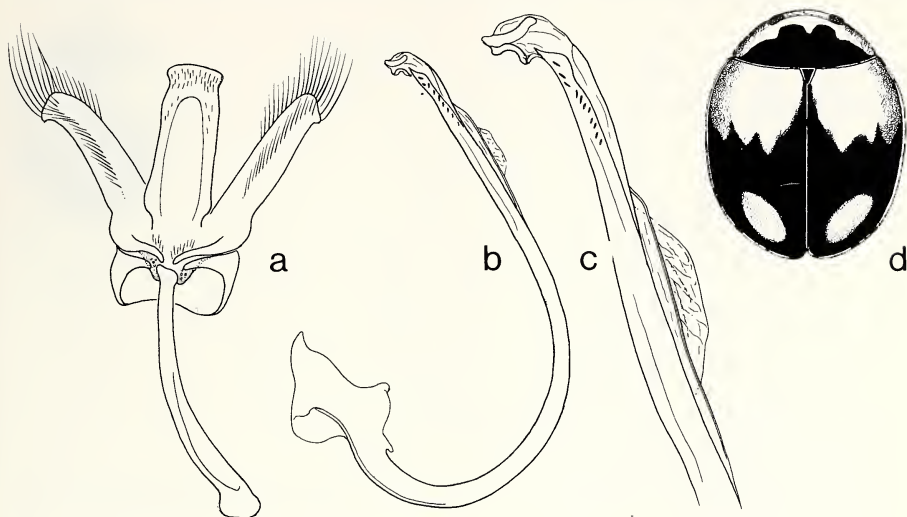


Fig. 482. *Brachiacantha schwarzi*.

7th abdominal sterna reddish brown. Punctures on head fine, separated by less than a diameter; pronotal punctures coarser than on head, separated by a diameter or less; punctures on elytron coarser than on pronotum, separated by a diameter or less. Metasternum coarsely punctured, punctures sparse medially, slightly denser laterally. Abdominal sterna finely, densely punctured throughout except median area of first sternum impunctate, polished. Postcoxal line on first abdominal sternum rounded, area within line somewhat alutaceous, mostly impunctate. Median depression of 4th and 5th sterna feeble. Genitalia as in Figure 482a-c.

Female, length 2.75 mm, width 2.10 mm. Similar to holotype except head black, frons yellow; pronotum entirely black except narrow anterolateral angle yellow; abdomen entirely black.

Variation. Length 2.30 to 3.20 mm; width 1.80 to 2.60 mm. The basal and humeral spots on each elytron are either distinctly divided at the hind margin, or nearly completely fused.

Holotype. Male. FLORIDA: Gainesville, II-V-1930 (USNM 101346).

Allotype. Female. FLORIDA: Jacksonville, Collection Ashmead. (USNM).

Paratypes. Total 30 (Fig. 481). FLORIDA: Alachua Co., 30-III-54, H. A. Denmark coll; Alachua Co., 10-III-55, H. V. Weems, Jr. coll; Alachua Co., 4-VIII-1977, H. Greenbaum; Alachua Co., Devil's Millhopper, 26-II-26, G. B. Merrill coll; Alachua Co., Gainesville, Austin Cary Forest, Vic. Hatchett Creek, 8-III-1976, Flight Trap, G. B. Fairchild; Alachua Co., Gainesville, Austin Cary Forest, 24-IX-1976, 28-VI-1976, 20-IX-76, 9-11-IX-75, 12-VII-76, G. B. Fairchild, Flight Trap; Alachua Co., Gainesville, Doyle Conner Bldg. 1-6-12-1972, H. V. Weems, Jr.; Alachua Co., 9 mi. N.W. Gainesville, UF Hort Unit, 5R 232, 18-28-VIII-1977, H. N. Greenbaum; Alachua Co., W. of Gainesville, Pierce's Homestead, 22-II-4-III-76, Malaise Trap,

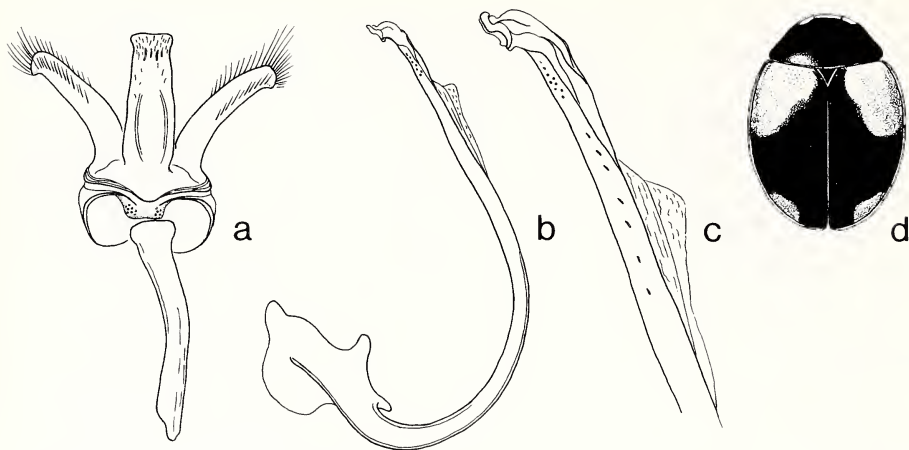


Fig. 483. *Brachiacantha querceti*.

W. H. Pierce; Gainesville; Gainesville, V-29-64, VIII-8-64, VIII-9-64, R. E. White coll; Gainesville, 2-1955, L.A. Hetrick; Gainesville, Doyle Conner Bldg., Dodge, 5-X-72; Gainesville, Doyle Conner Building, 27-VII-73, H. V. Weems, Jr., Malaise Trap; Gainesville, Doyle Conner Building, 8-IX-1973, H. V. Weems, Jr., Malaise Trap; Gainesville, Doyle Conner Building, 5-7-I-1974, H. V. Weems, Jr., Malaise Trap; Green Cove Spgs., 24-III-1952, J. R. Vockeroth; Jacksonville, 30-IV-67, C. F. Zeiger coll; Lake Kerr, Ocala Nat. For., 23-III-61, R. E. Woodruff; Wakulla Co., 20-IV-55, F. W. Mead. GEORGIA: Loundes Co., XI-12-62, collr. E. I. Hazard. (FSCA) (CNC) (USNM).

This species and *B. querceti* Schwarz resemble each other closely and are the only North American species of *Brachiacantha* having the elytral color pattern as in Figure 482d. Characters of value in distinguishing these 2 species are: head of *B. querceti* yellow (male) or dark brown (female); head of *B. schwarzi* yellow (male) or black with yellow frontal area (female); female pronotum entirely black or dark brown in *B. querceti*, with anterolateral angle yellow in *B. schwarzi*; elytral spots orange in *B. querceti*, yellow in *B. schwarzi*; base of elytron with one apparent spot in *B. querceti*, 2 partially divided spots or one large spot with ragged posterior margin in *B. schwarzi*; body oval in *B. querceti*, round in *B. schwarzi*. In addition, they appear to be allopatric within Florida, but this might be an artifact of collecting.

Brachiacantha querceti Schwarz

Fig. 483a-d; Map, Fig. 481

Brachyacantha querceti Schwarz, 1878, p. 362.—Casey, 1899, p. 118.—Leng, 1911, p. 324.—Leng, 1920, p. 212.—Korschevsky, 1931, p. 207.

Diagnosis. Length 2.20 to 2.80 mm, width 1.65 to 2.25 mm. Form oval, slightly elongate. Male head entirely yellow; female head entirely brown. Pronotum of male black, narrowly yellow on anterior margin, anterolateral angle narrowly yellow; fe-

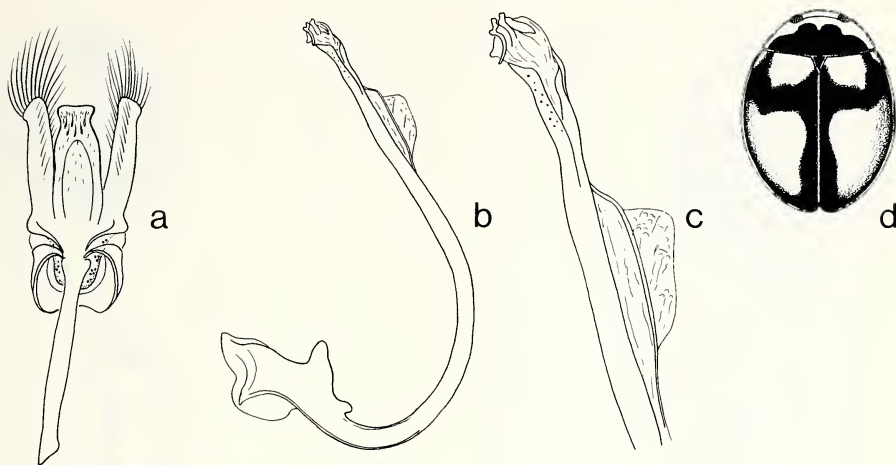


Fig. 484. *Brachiacantha floridensis*.

male pronotum entirely black or brown. Elytron as described for *B. schwarzi*, except basal spot entire, not partially divided (Fig. 483d), spots orange. Postcoxal line rounded. Male genitalia as in Figure 483a–c.

Discussion. See remarks under *B. schwarzi*, n. sp., for comparative statements. There are 3 types of *B. querceti* in the USNM collection, all females. I here designate and label one specimen as the lectotype, the other 2 as paralectotypes.

Type locality. Tampa, Florida (lectotype here designated).

Type depository. USNM 4514.

Distribution. Figure 481. FLORIDA: Estero; Manatee Co., Myakka Head; Polk Co.; Punta Gorda; St. Petersburg; Tampa; Venice; Vero Beach.

Brachiacantha floridensis Blatchley

Fig. 484a–d; Map, Fig. 481

Brachyacantha floridensis Blatchley, 1916, p. 93.—Leng, 1920, p. 212.—Blatchley, 1930, p. 39.—Korschefsky, 1931, p. 205.

Diagnosis. Length 2.50 mm, width 1.80 mm. Form oval, lateral margin strongly curved. Male head entirely yellow; female head black except frontal area yellow; male pronotum black except apical $\frac{1}{3}$ yellow, female pronotum black except antero-lateral angle yellow. Elytron with distinctly separated basal and humeral spots, apical spots completely confluent (Fig. 484d). Postcoxal line rounded. Male genitalia as in Figure 484a–c.

Discussion. I have seen only a type and one other specimen of this species. Superficially *B. floridensis* resembles *B. bollii* Crotch, but actually the closest relationship is with *B. schwarzi* and *B. querceti*, from which *B. floridensis* differs in elytral pattern. Should the elytral pattern prove to be extremely variable, then *B. schwarzi* and *B. floridensis* are probably synonymous. Blatchley (1930) designated a male specimen as the lectotype, but the specimen in the PU collection is a female.

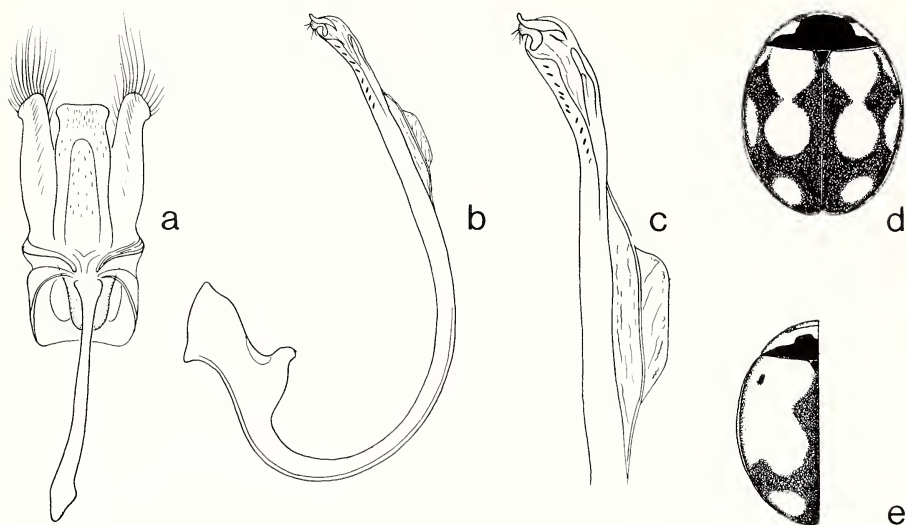


Fig. 485. *Brachiacantha bollii*.

Type locality. Ocala, Florida

Type depository. PU.

Distribution. Figure 481. FLORIDA: LaCross; Ocala.

Brachiacantha bollii Crotch

Fig. 485a-e; Map, Fig. 481

Brachyacantha bollii Crotch, 1873, p. 379.—Gorham, 1894, p. 188.—Casey, 1899, p. 118.—Leng, 1911, p. 314.—Leng, 1920, p. 212.—Korschevsky, 1931, p. 204.—J. Chapin, 1974, p. 46.

Diagnosis. Length 2.40 to 3.0 mm, width 1.90 to 2.30 mm. Form rounded, slightly elongate. Head yellow in both sexes except apex of female clypeus slightly darkened; male pronotum black except anterior $\frac{1}{3}$ yellow, female pronotum black except anterolateral angle broadly yellow. Elytron typically with 5 large, round spots (Fig. 485d), spots often confluent in basal $\frac{1}{2}$ (Fig. 485e). Postcoxal line rounded. Male genitalia as in Figure 485a-c.

Discussion. This species and *B. testudo* are similar in appearance, but the elytral spots are rarely confluent in *B. testudo*, when they are confluent the apical spots have the tendency to coalesce rather than the basal spots as in *B. bollii*. Crotch (1873) had more than one type specimen, therefore I here designate and label a male in the LeConte collection labeled "Dallas Tex. Boll/male sign/Type 4462(red paper)/*B. bollii* Crotch" as the lectotype, and a female labeled "Dallas Tex. Boll" as a paralectotype.

Type locality. Dallas, Texas (lectotype here designated).

Type depository. MCZ.

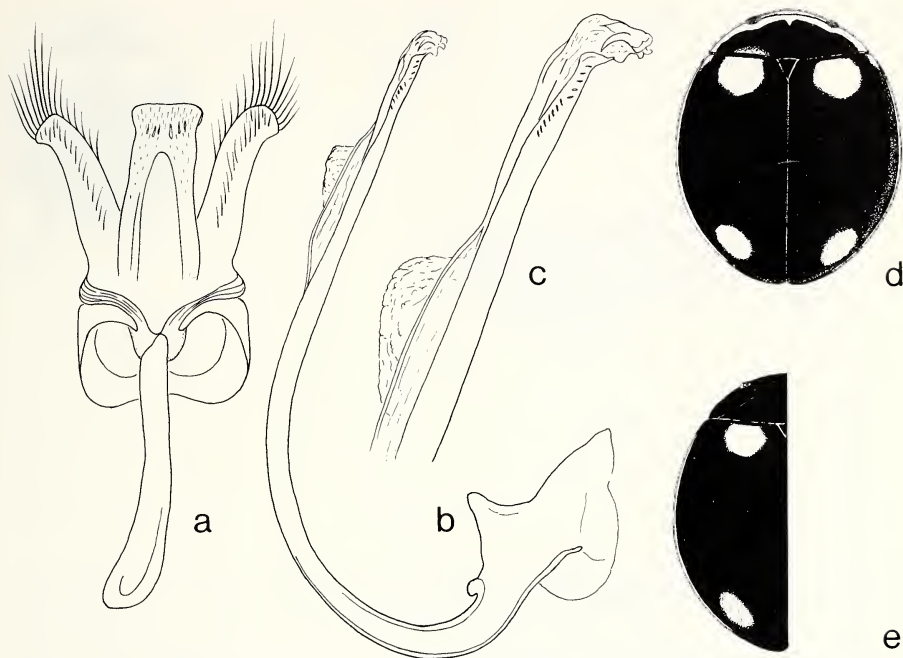


Fig. 486. *Brachiacantha quadripunctata quadripunctata*.

Distribution. Figure 481. LOUISIANA: Natchitoches; Rapides Parish; Vernon Parish; Vowell's Mill. TEXAS: Ardmore; Dallas; Harrison Co.; Kerrville.

Brachiacantha quadripunctata quadripunctata (Melsheimer)

Fig. 486a-e; Map, Fig. 488

Brachiacantha 4-punctata Melsheimer, 1847, p. 178.

Brachyacantha 4-punctata: Crotch, 1873, p. 378.—Blatchley, 1910, p. 521.—Leng, 1911, p. 316.

Brachiacantha quadripunctata: Leng, 1920, p. 212.—Korschefsky, 1931, p. 206.—Wingo, 1952, p. 27.—J. Chapin, 1974, p. 46 (in part).

Brachiacantha basalis Melsheimer, 1847, p. 177.

Brachyacantha basalis: Crotch, 1873, p. 378.—Casey, 1899, p. 118.—Leng, 1911, p. 317.—Korschefsky, 1931, p. 206.—Wingo, 1952, p. 27.

Brachyacantha diversa Mulsant, 1850, p. 538.—Leng, 1911, p. 316.—Korschefsky, 1931, p. 206.

Brachyacantha confusa Mulsant, 1850, p. 537.—Crotch, 1874b, p. 212.—Leng, 1911, p. 319.—Wingo, 1952, p. 27.

Brachyacantha 4-punctata confusa: Leng, 1911, p. 319.

Brachyacantha quadripunctata ab. *confusa*: Korschefsky, 1931, p. 206.

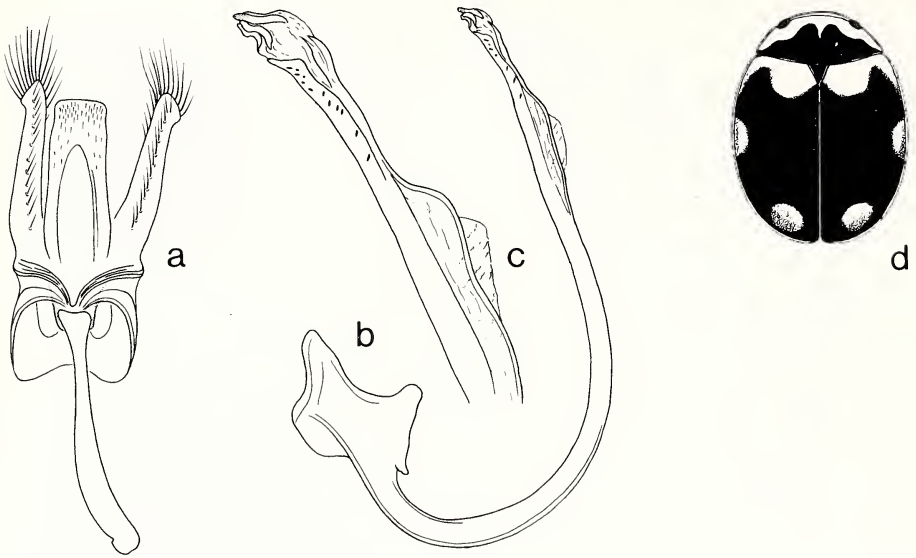


Fig. 487. *Brachiacantha quadripunctata flavifrons*.

Diagnosis. Length 2.50 to 4.0 mm, width 2.0 to 3.20 mm. Form round. Male head yellow, female head black; male pronotum usually black except narrow apical margin and anterolateral angle yellow, but often with anterior $\frac{1}{3}$ yellow. Elytron black with basal and apical spot (female) or with additional humeral spot often confluent with basal spot (male) (Fig. 486d, e). Postcoxal line angulate. Male genitalia as in Figure 486a-c.

Discussion. The dorsal color pattern, although somewhat variable, is usually sufficient as an identification character. Melsheimer (1847) apparently had a single female type specimen of *B. quadripunctata* now in the LeConte collection labeled "Melsh. 4-punctata/(ragged red paper)/". This specimen will be labeled as the holotype. Exactly the same statements apply to the holotype of *B. basalis* labeled "Melsh. basalis/(ragged red paper)". I here designate and label a male in the Dejean collections labeled "Amer. bor., LeConte" as the lectotype of *B. diversa*, and a female in the same collection with identical data as the lectotype of *B. confusa*.

Type locality. of *quadripunctata*, Pennsylvania; of *basalis*, Pennsylvania; of *diversa* and *confusa*, "Amer. bor." (lectotypes here designated).

Type depository. of *quadripunctata* and *basalis*, MCZ; of *diversa* and *confusa*, DLM.

Distribution. Figure 488. Massachusetts and New York to Virginia and Tennessee, west to Iowa and Kansas.

Brachiacantha quadripunctata flavifrons Mulsant

Fig. 487a-d; Map, Fig. 488

Brachyacantha flavifrons Mulsant, 1850, p. 531. Crotch, 1874b, p. 212.— Casey, 1899, p. 118.

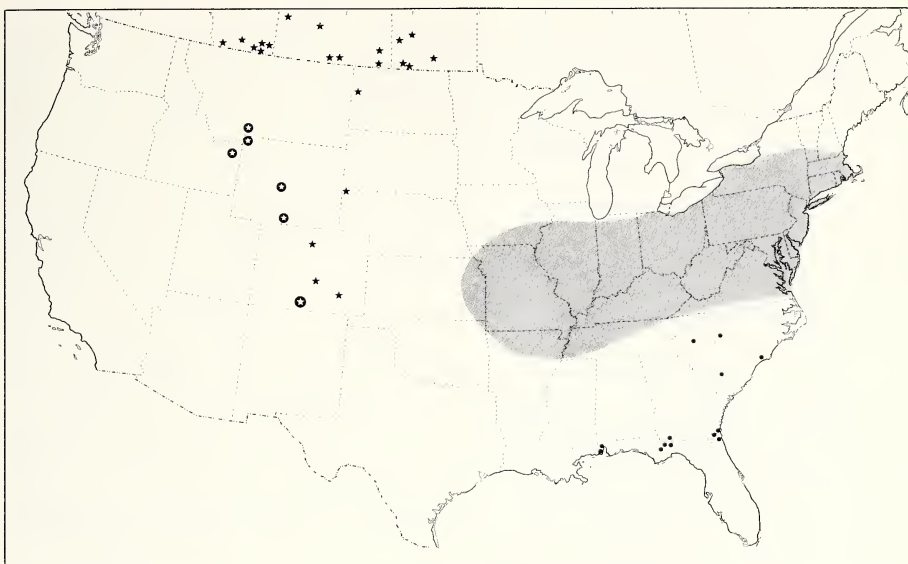


Fig. 488. Distribution. *Brachyacantha quadripunctata quadripunctata* (shaded); *B. quadripunctata flavifrons* (dot); *B. illustris* (circled star); *B. albifrons* (star).

Brachyacantha ursina flavifrons: Crotch, 1873, p. 378.

Brachyacantha quadripunctata flavifrons: Leng, 1920, p. 212.

Brachyacantha 4-punctata flavifrons: Leng, 1911, p. 319.

Brachyacantha quadripunctata ab. *flavifrons*: Korschefsky, 1931, p. 206.

Hyperaspis carolina Casey, 1924, p. 164.—Korschefsky, 1931, p. 185.

Brachyacantha carolina: Dobzhansky, 1941, p. 85.

Description as for *B. quadripunctata*, except elytron with one marginal spot in addition to basal and apical spots (Fig. 487d). Male genitalia as in Figure 487a–c.

I agree with Leng's (1911) placement of *B. flavifrons* as a subspecies of *B. quadripunctata* because the color pattern differences exhibit a geographic correlation; *B. flavifrons* having a mostly southern distribution and *B. quadripunctata* a northern distribution. I here designate and label a male in the Dejean collection labeled "Amer. bor., LeConte" as the lectotype. I agree with Dobzhansky that *carolina* is a synonym of *flavifrons*. The type of *carolina* is a unique female (holotype).

Type locality. Of *flavifrons*, "l'Amerique septentrionale" (lectotype here designated); of *carolina*, Southern Pines, North Carolina.

Type depository. Of *flavifrons*, DLM; of *carolina*, USNM (35211).

Distribution. Figure 488. ALABAMA: Grand Bay; Mobile; Spring Hill. FLORIDA: Jacksonville; Leon Co., Tallahassee; Liberty Co., Torreya St. Pk.; Mount Pleasant; Nassau Co., Hilliard. GEORGIA: Beachton; Grady Co.; Jekyll Island. NORTH CAROLINA: Chadborne; Tryon. SOUTH CAROLINA: Meredith.

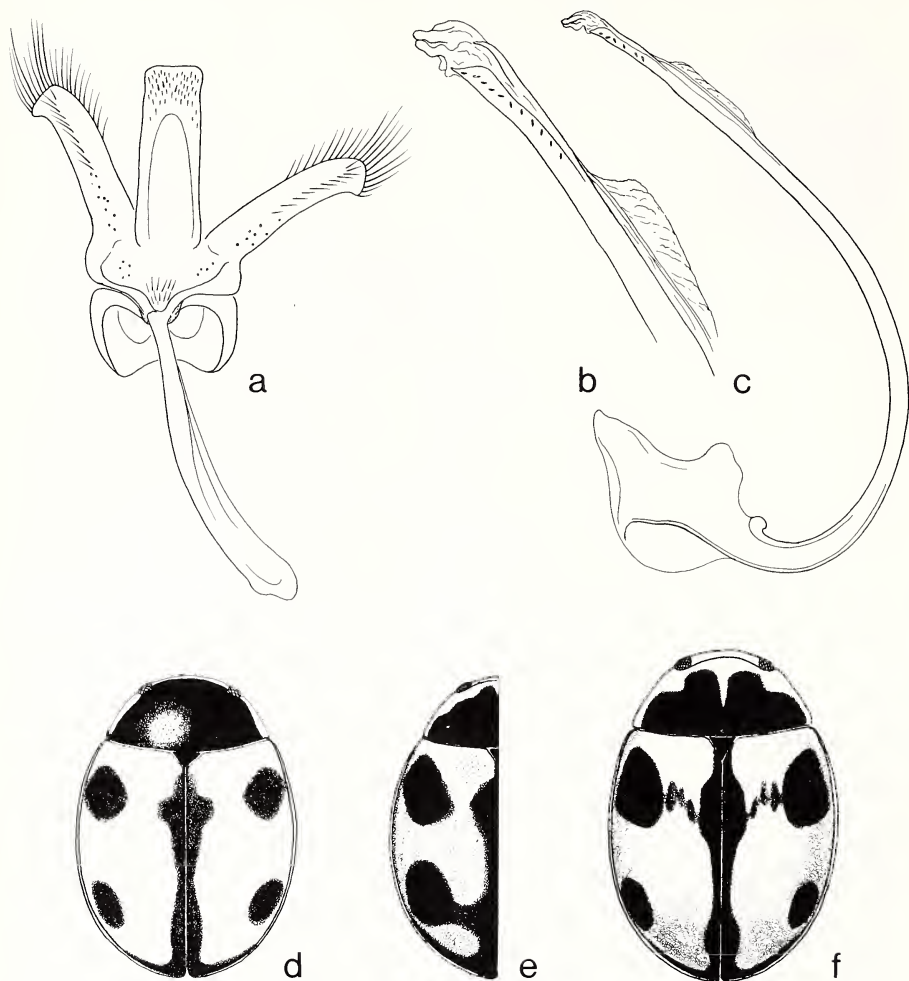


Fig. 489. *Brachiacantha albifrons*.

Brachiacantha albifrons (Say)

Fig. 489a-f; Map, Fig. 488

Coccinella albifrons Say, 1824, p. 94.—Mulsant, 1850, p. 1049.

Brachiacantha albifrons: LeConte, 1852, p. 132.

Brachiacantha albifrons: Crotch, 1873, p. 378.—Crotch, 1824b, p. 212.—Casey, 1899, p. 119.—Leng, 1911, p. 320.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 203.

Brachyacantha pacifica Casey, 1899, p. 119.—Leng, 1911, p. 321.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 206. **New Synonymy.**

Diagnosis. Length 3.50 to 4.40 mm, width 2.40 to 3.0 mm. Form slender, elongate. Head yellow in both sexes, female with clypeal apex brown; male pronotum black

except anterior $\frac{1}{3}$ yellow, apex of black area sharply emarginate, female pronotum similar to male except black area larger, not apically emarginate. Elytron typically yellow with suture and 2 spots brown (Fig. 489d), pattern often partially coalesced (Fig. 489e, f). Postcoxal line rounded. Male genitalia as in Figure 489a–c.

Discussion. The typical form of *B. albifrons* is easily recognizable, but the forms with coalesced elytral spots resemble examples of *B. illustris* (see remarks under that species). The *B. pacifica* that Casey described from Santa Monica, California, is a mislabeled specimen of *B. albifrons*. No species of *Brachiacantha* occur in coastal southern California. Therefore, I do not hesitate to synonymize *B. pacifica* with *B. albifrons*.

Type locality. Of *albifrons*, "Taken on the Missouri by Mr. Nuttall"; of *pacifica*, Santa Monica, California.

Type depository. Of *albifrons*, type lost; of *pacifica* USNM (35573).

Distribution. Figure 488. ALBERTA: Aden; Conrad; Lethbridge; Manyberries; Medicine Hat; Scandia. MANITOBA: Aweme; Carberry; Roblin; Russell; Virden. SASKATCHEWAN: Beaver Creek; Cut Knife, Attons Lake; Lebre; Mossbank; St. Victor; Saskatoon. COLORADO: Boulder; Colorado Springs; Rocky Ford. NEBRASKA: War Bonnet Canyon. NORTH DAKOTA: Williston.

Brachiacantha illustris Casey

Fig. 490a–f; Map, Fig. 488

Brachyacantha illustris Casey, 1899, p. 118.—Bowdith, 1902, p. 206.—Leng, 1911, p. 320.—Korschefsky, 1931, p. 205.

Diagnosis. Length 3.40 to 4.60 mm, width 2.50 to 3.0 mm. Form elongate, oval. Pronotum of male black with anterior margin and anterolateral angle broadly yellow, apical margin of black area deeply indented; female pronotum as described for male except apical margin black or narrowly yellow. Color pattern on elytron variable, typical form with all spots connected except discal spot (Fig. 490d), variations as in Figure 490e, f. Postcoxal line rounded. Male genitalia as in Figure 490a–c.

Discussion. This species is most likely to be confused with *B. albifrons*, and in fact may be conspecific with it. However, *B. albifrons* is apparently a Great Plains species while *illustris* is a mountain or high altitude species. I have seen no examples of *illustris* which have the clear, sharp elytral pattern of typical *B. albifrons*, and both males and females of *B. albifrons* have the yellow, lateral pronotal areas more expanded than the corresponding sex of *B. illustris*. The type of *B. illustris* is a unique female (holotype) in the Casey collection.

Type locality. Colorado, Beaver Brook, 6000 ft.

Type depository. USNM (35572).

Distribution. Figure 488. COLORADO: Mosca. IDAHO: Beaver Canyon. MONTANA: Gallatin Valley; Livingston. WYOMING: Yellowstone National Park, Mammoth Hot Springs, Roosevelt Lake.

indubitabilis group

Anterior tibia as in the *ursina* group except spine very slender; abdomen of male with 5th sternum modified; basal lobe of male genitalia asymmetrical, apex emarginate on side (Fig. 491a), siphon without fan-like membranous lobe (Fig. 491c).

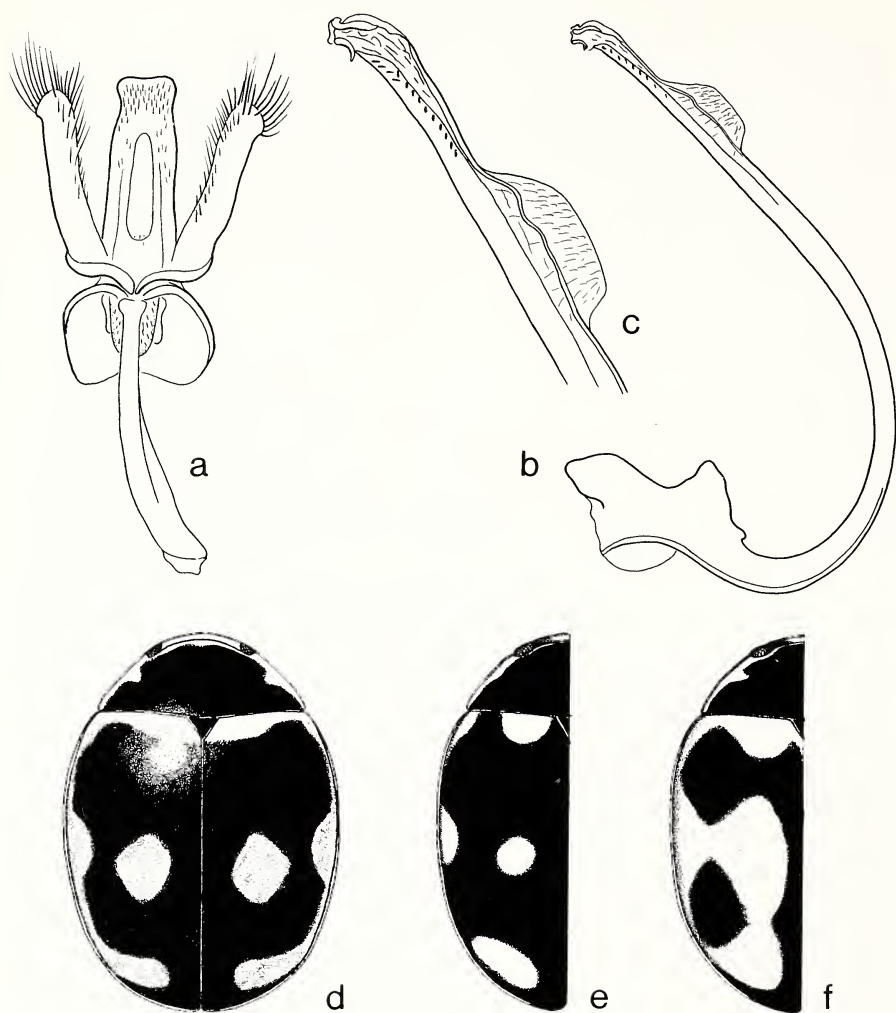


Fig. 490. *Brachiacantha illustris*.

Brachiacantha indubitabilis is the only North American species in this group, and I consider it unlikely that any neotropical species possesses the extremely characteristic male genitalia of this species. The external morphology of *B. indubitabilis* would place it in the *ursina* group, but I propose a monotypic group for this species because of the distinctive male genitalia.

Brachiacantha indubitabilis Crotch

Fig. 491a-d; Map, Fig. 492

Brachyacantha indubitabilis Crotch, 1873, p. 379.—Casey, 1899, p. 120.—Leng, 1911, p. 315.—Korschefsky, 1931, p. 205.

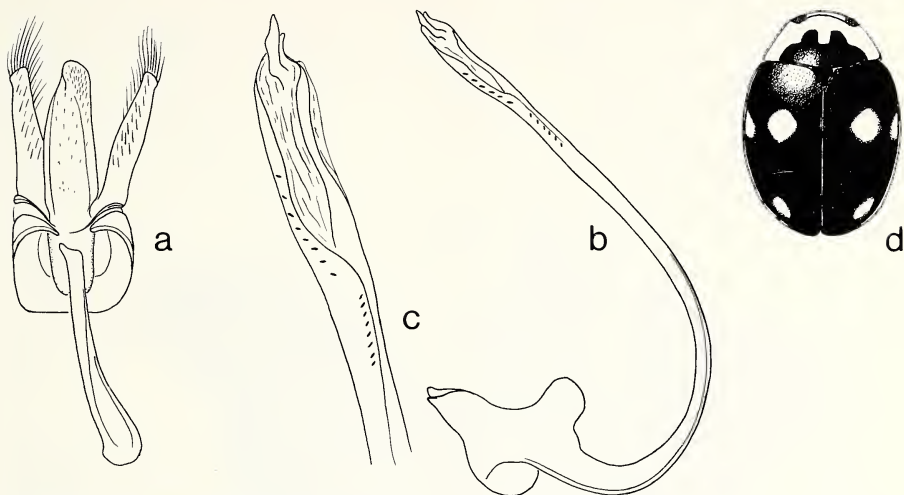


Fig. 491. *Brachiacantha indubitabilis*.

Hyperaspis triplicans Casey, 1924, p. 163.—Korschefsky, 1931, p. 198.—Dobzhansky, 1941, p. 11. **New Synonymy.**

Hyperaspis triplicans microsticta Casey, 1924, p. 163.—Korschefsky, 1931, p. 192, 198.—Dobzhansky, 1941, p. 11. **New Synonymy.**

Diagnosis. Length 2.50 to 3.20 mm, with 1.80 to 2.60 mm. Form oval. Male head yellow, female head yellowish brown except frons usually paler yellow; male pronotum black except anterior $\frac{1}{3}$ yellow, female pronotum black except lateral $\frac{1}{4}$ yellow. Elytron black with 3 yellow spots (Fig. 491d). Postcoxal line rounded. Male genitalia as in Figure 491a–c.

Discussion. The presence of only 3 elytral spots in a unique arrangement, 2 median, one apical, will usually identify this species. In addition, the anterior tibial spine is usually long and slender, although some examples of *B. indubitabilis* do not differ strikingly from *B. ursina* in this respect. Dobzhansky (1941) considered *Hyperaspis triplicans* and *H. t. microsticta* Casey junior synonyms of *Hyperaspis pratensis* LeConte. Examination of the types shows that they are junior synonyms of *B. indubitabilis*. Crotch (1873) had more than one type specimen of *B. indubitabilis*, therefore I here designate and label a female in the LeConte collection labeled "Type 8244 (red paper)/*B. indubitabilis* Crotch" as the lectotype.

Type locality. Of *indubitabilis*, Illinois (lectotype here designated); of *triplicans* and *microsticta*, Southern Pines, N.C.

Type depository. Of *indubitabilis*, MCZ; of *triplicans* (35210) and of *microsticta* (35212), USNM.

Distribution. Figure 492. Massachusetts and New York to North Carolina, west to Iowa and Illinois.

lepida group

Anterior tibia as in the *ursina* group; abdomen of male with only 5th sternum modified, apex of 5th sternum barely perceptibly depressed; male genitalia with basal

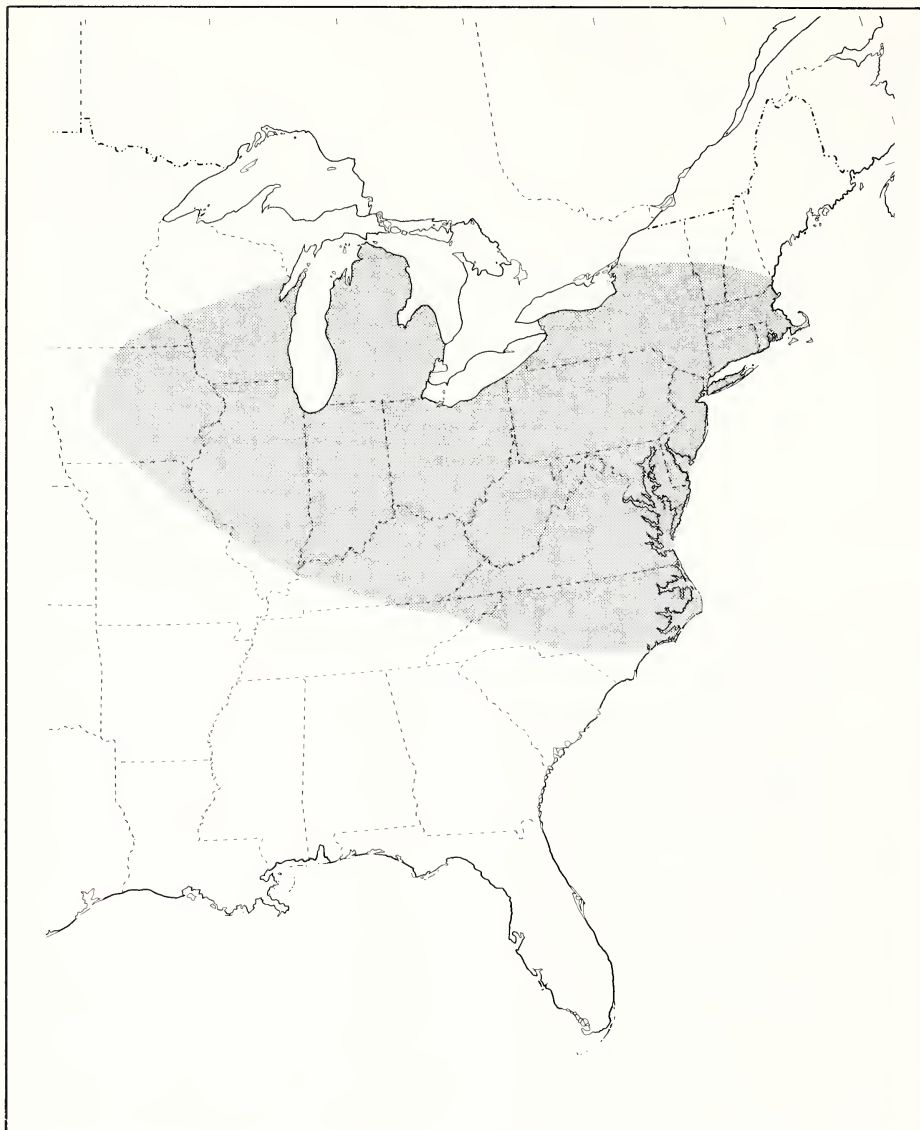


Fig. 492. Distribution. *Brachiacantha indubitabilis*.

lobe asymmetrical, apex obliquely truncate (Fig. 493a), siphon without fan-like membranous lobes (Fig. 493b).

Brachiacantha lepida is the only species I include in the group, but there are probably other neotropical species that fit the criteria outlined here.

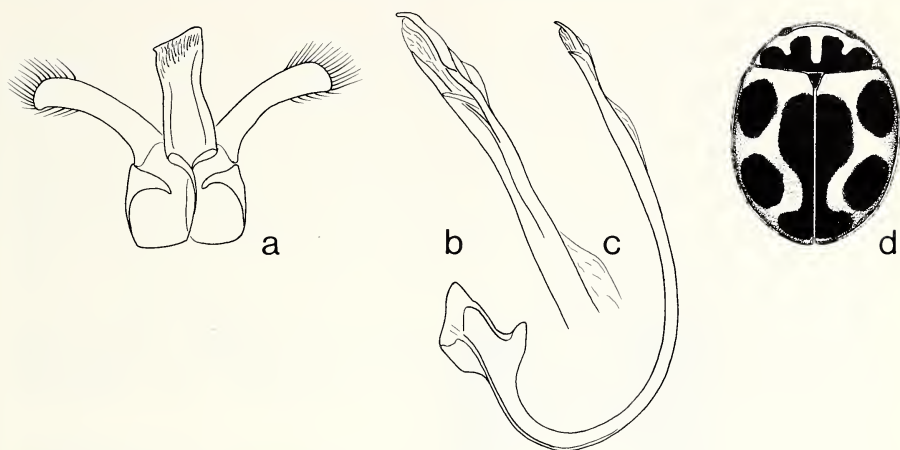


Fig. 493. *Brachiacantha lepida*.

Brachiacantha lepida Mulsant

Fig. 493a-d

Brachyacantha lepida Mulsant, 1850, p. 523.—Crotch, 1873, p. 378.—Crotch, 1874b, p. 210.—Gorham, 1894, p. 185.—Leng, 1911, p. 324.—Leng, 1920, p. 212.—Korschefsky, 1931, p. 205.

Diagnosis. Length 2.50 to 3.60 mm, width 1.70 to 2.40 mm. Form oval. Head yellow in both sexes; pronotum with black area in basal $\frac{1}{2}$ sharply emarginate. Elytron yellow with 2 lateral black spots and a discal and apical spot joined with those on opposite elytron (Fig. 493d). Postcoxal line rounded. Male genitalia as in Figure 493a-c.

Discussion. The elytral color pattern of *B. lepida* is unique within the genus, making it easily recognizable. Crotch (1873) listed it from "Texas", but it seems not to have been found in Texas or anywhere north of Mexico since. I have included it on the chance that it might still be collected north of Mexico. I have located 3 type specimens of *lepida* and here designate and label a male labeled "Mexico" as the lectotype. One paralectotype in the Paris Museum bears no data and one paralectotype in the British Museum (NH) is labeled "Named by Mulsant."

Type locality. Mexico (lectotype here designated).

Type depository. DLM.

Distribution. Mexico to Costa Rica.

Tribe Cryptognathini

Cryptognathini Gordon, 1971, p. 181.

Oeniini Casey, 1899, p. 74.—Chapin, 1940, p. 263.—Korschefsky, 1931, p.

218.—Gordon, 1971, p. 184. Type-genus preoccupied.

Scymninae with form round, convex; dorsal surface glabrous. Head directed ventrally or slightly posteriorly, usually at least partly concealed behind prosternum. Antenna short, compact, 8–10 segmented. Maxillary palpus with apical segment ovate to securiform. Prosternum narrowly or widely produced in front of coxal cavity, not emarginate; prosternal lobe widely separating coxae. Epipleuron descending externally, or horizontal, foveate for reception of femoral apices. Metasternum and first abdominal sternum deeply impressed for reception of femora. Leg with femur and tibia expanded and modified for reception of tibia and tarsus, anterior leg with strongly modified tibia; tarsal claw feebly toothed at base. Abdomen with 5 visible sterna. Postcoxal line incomplete.

This tribe is native to the neotropics, but at least one species has been introduced into other regions for biocontrol purposes. Gordon (1971) reviewed the tribe at the generic level and recognized 4 valid genera, one of which occurs in the United States.

Genus *Cryptognatha* Mulsant

Cryptognatha Mulsant, 1850, p. 497.—Crotch, 1874b, p. 206.—Korschefsky, 1931, p. 218.—Chapin, 1964, p. 231.—Gordon, 1971, p. 183. Type-species; *Cryptognatha auriculata* Mulsant, by subsequent designation of Crotch, 1874b.

Cryptognathini with length 1.10–3.10 mm. Clypeus with anterior margin upturned, anterior angle usually sharp (Fig. 494a). Antenna usually 10-segmented, club apparently 4-segmented (Fig. 494b). Apical segment of maxillary palpus securiform (Fig. 494c). Anterior leg with tibia strongly expanded for reception of tarsus, outer edge sinuate, slightly narrower than femur. Abdomen with postcoxal line incomplete, extending nearly to lateral margin (Fig. 494d). Male genitalia symmetrical. Female genitalia with genital plate elongate, triangular (Fig. 494e).

The genus most likely to be confused with *Cryptognatha* is *Delphastus*, but *Cryptognatha* has the elytral epipleura descending externally and the form of the clypeal apex (Fig. 494a) is broad and truncate medially. The only species of this genus in North America is *C. nodiceps* Marshall which was introduced from Trinidad into Florida for biocontrol of coconut scales in 1936. I have seen 2 recently collected specimens from Miami, Florida, the area in which it was released in 1936. It may have existed there since 1936 and 1938, or these specimens may be the result of an accidental introduction. Members of this genus are scale feeders with *Aspidiotus destructor* (Signoret) and *Pseudaulacaspis pentagona* (Targioni-Tozzetti) recorded as hosts, but many other scale insects undoubtedly also serve as hosts. *Cryptognatha* has not been taxonomically treated as a whole; Chapin (1964) reviewed those species occurring in Colombia.

Cryptognatha nodiceps Marshall

Fig. 494a–j

Cryptognatha nodiceps Marshall, 1912, p. 321.—Korschefsky, 1931, p. 219.—Chapin, 1965b, p. 249.

Diagnosis. Length 1.20 to 1.66 mm, width 0.90 to 1.35 mm. Form round, convex. Color pale yellow; pronotum pale reddish yellow, with or without 2 yellowish brown basal lines on each side of middle at base; elytron with variable dark brown pattern

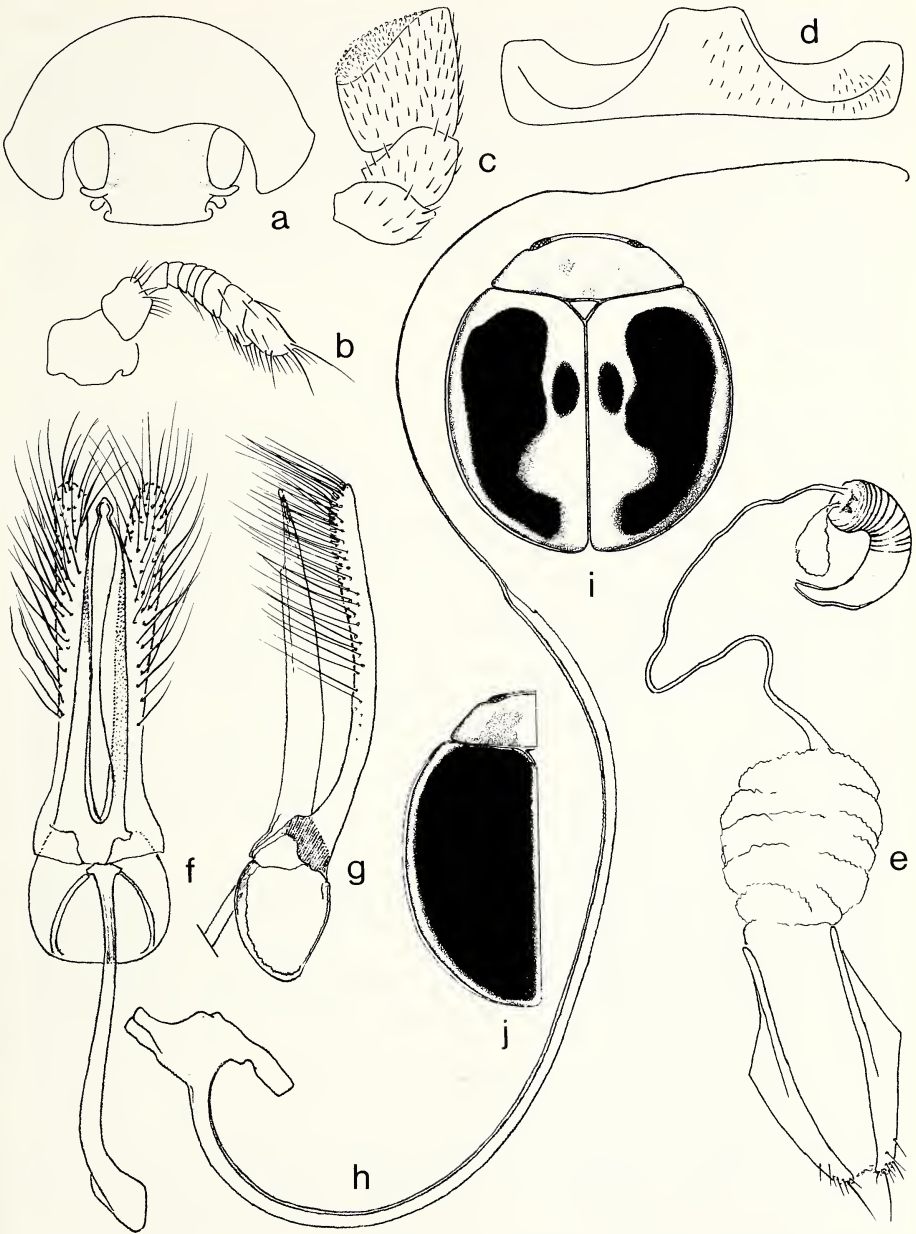


Fig. 494. *Cryptognatha nodiceps*. a. Head. b. Antenna. c. Maxillary palpus. d. Postcoxal lines. e. Female genitalia. f-h. Male genitalia. i-j. Habitus and variation.

(Figs. 494i, j); pro-, meso- and metasterna reddish yellow. Postcoxal line incomplete. Male genitalia as in Figure 494f-h. Female genitalia as in Figure 494e.

Discussion. The host records I have seen for this species have all been *Aspidiotus destructor* (Signoret). In addition to the United States, *C. nodiceps* has been introduced and established in Fiji and the Mariana Islands. There are 4 types of *nodiceps*. The first of these, a male labeled "Type H.T. (white disc with orange border)/Trinidad C. W. Hewer 1902-207/Cryptognatha nodiceps, Mshl. Type", I designate and label as the lectotype. The remaining 3 are designated as paralectotypes.

Type locality. Cedros, Trinidad (lectotype here designated).

Type depository. BMNH.

Distribution. FLORIDA: Miami.

Subfamily Chilocorinae

Chilocorinae Sasaji, 1968, p. 20.—J. Chapin, 1974, p. 48.—Belicek, 1976, p. 293.

Coccinellidae with clypeus expanded laterally. Antenna reduced, 10-segments or less. Apical segment of maxillary palpus cylindrical with truncate apex; maxillary cardo expanded or strongly sclerotized. Pronotum strongly descending laterally, deeply concave on anterior margin. Base of elytron distinctly broader than base of pronotum. Metasternum impressed for reception of middle femora. Tibia often angulate externally.

Sasaji (1968) erected this subfamily for 3 tribes, Telsimiini, Platynaspini, and Chilocorini. Only the Chilocorini occur in the Western Hemisphere.

Tribe Chilocorini Costa

Chilocorini Costa, 1849, p. 9.—Weise, 1885a, p. 4.—Casey, 1899, p. 104.—Leng, 1908, p. 33.—Blatchley, 1910, p. 517.—Leng, 1920, p. 217.—Mader, 1927, p. 23.—Wingo, 1952, p. 24.—Mader, 1955, p. 772.—Chapin, 1965a, p. 234.—J. Chapin, 1974, p. 48.—Belicek, 1976, p. 293.

Coccinellinae with length 2.0 to 8.0 mm; form oval to nearly circular; dorsal surface glabrous or pubescent. Antenna short, terminal segments forming fusiform club, base concealed beneath genal extension of clypeus which is shelflike and partially divides eye. Prosternal process without carinae. Abdomen usually with 6 visible sterna in male, 5 in female, sometimes 5 in both sexes, or 6 in both sexes. Tibia simple or angulate externally; with or without apical spurs. Tarsus cryptotetramerous; claw simple, or swollen at base, or with basal tooth. Male genitalia symmetrical or asymmetrical. Female genitalia with long sperm duct, infundibulum present or absent.

There are 5 native North American genera; one introduced genus is established in California. The tribe is worldwide in distribution, but most species are tropical. The presence of a strongly expanded gena that partially divides the eye is an excellent diagnostic character, particularly in the North American fauna. Chapin (1965a) revised the genera of Chilocorini for the world.

KEY TO GENERA OF CHILOCORINI

1. Postcoxal line on first abdominal sternum merging with posterior margin of sternum (Fig. 528b) *Chilocorus* Leach

- Postcoxal line on first abdominal sternum not merging with posterior margin of sternum 2
- 2(1). Postcoxal line on first abdominal sternum parallel and close to posterior margin of first sternum (Fig. 527b) *Halmus* Mulsant
- Postcoxal line on first abdominal sternum recurved apically, complete or not 3
- 3(2). Postcoxal line on first abdominal sternum complete (Fig. 495b) 4
- Postcoxal line on first abdominal sternum incomplete (Fig. 504c) 5
- 4(3). Tarsal claw without basal tooth (Fig. 495c) *Brumoides* Chapin
- Tarsal claw with basal tooth (Fig. 511c) *Exochomus* Redtenbacher
- 5(3). Elytron without reflexed margin, with marginal bead; length less than 4.0 mm
- *Arawana* Leng
- Elytron with marginal feebly reflexed, with or without marginal bead; length more than 5.0 mm *Axion* Mulsant

Brumoides Chapin

Brumoides Chapin, 1965a, p. 237.—Belicek, 1976, p. 320. Type-species; *Coccinella suturalis* Fabricius, by original designation.

Chilocorini with form oval, convex, upper surface glabrous. Antenna 8-segmented, club 3-segmented with apical segment partly embedded in penultimate (Fig. 495a). Apical segment of maxillary palpus securiform. Prosternal lobe narrow, truncate apically. Elytral margin slightly reflexed; epipleuron descending, not foveolate for reception of femoral apices. Abdomen with 6 visible sterna in male, 5 in female. Postcoxal line complete (Fig. 495b). Leg slender, femur not inflated; tibial spur present; tarsal claw slightly thickened at base, without angular basal tooth (Fig. 495c). Male genitalia symmetrical. Female genitalia with long sperm duct; small infundibulum present (Fig. 496a).

Brumoides is found worldwide but I am able to recognize only 3 species that occur in the United States and Canada. This is a genus that will bear further study and I am not satisfied that the arrangement of species and subspecies presented here is entirely correct. The male genitalia of all species are extremely similar to one another and the female infundibulum is apparently somewhat variable within each species. The dorsal color patterns of the species often overlap, or the same pattern will recur in more than one species, thus color pattern is often not adequate in itself to distinguish species. The meagre host data I have seen recorded is as follows: *Coccidohystrix insolitus* (Green), *Dactylopius confusus* (Cockerell), *Pseudococcus* sp.

KEY TO SPECIES OF *Brumoides*

- 1. Dorsal surface completely black; form elongate (Fig. 503e) *blumi* (Nunenmacher)
- Dorsal surface usually not entirely black, or if so, then form rounded (Fig. 501b) . 2
- 2(1). Form nearly round (Fig. 501b); border of elytron definitely explanate, anterolateral angle pronounced *histrion* (Fall)
- Form elongate (Fig. 499b); border of elytron feebly explanate, anterolateral angle not pronounced 3
- 3(2). Dorsal punctures dense, coarse; eastern United States, New York and New Jersey west to Wisconsin *septentrionis davisii* (Leng)
- Dorsal punctures fine, not dense; western United States and Canada 4
- 4(3). Elytron strongly alutaceous; pronotal angle and propleuron black; Hudson Bay and

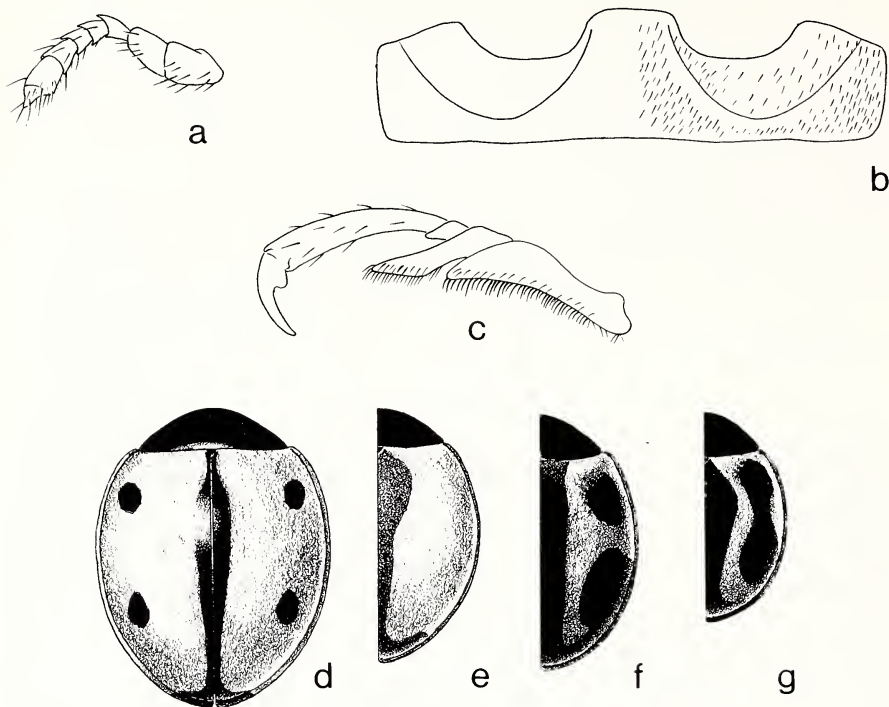


Fig. 495. *Brumoides* sp. a. Antenna. b. Postcoxal lines. c. Tarsus. d-g. Habitus and variation of *B. septentrionis septentrionis*.

Alaska south to Colorado, northern Arizona and California

- *septentrionis septentrionis* (Weise)
- Elytron smooth, shiny; pronotal angle and propleuron not black; western Texas to Colorado and Idaho
- *septentrionis hoguei* (Gorham)

Brumoides septentrionis septentrionis (Weise)

Fig. 495d-g; Map, Fig. 497

Brumus septentrionis Weise, 1885b, p. 230.—Weise, 1904, p. 360.—Horn, 1886, p. xiv.—Gorham, 1894, p. 177.—Casey, 1908, p. 412.—Korschevsky, 1932, p. 266.

Exochomus (Brumus) septentrionis: Leng, 1908, p. 42.

Brumoides septentrionis: Chapin, 1965a, p. 239.—Belicek, 1976, p. 320.

Exochomus ovoideus Casey, 1899, p. 107.—Belicek, 1976, p. 320.

Brumus ovoideus: Casey, 1908, p. 412.

Exochomus (Brumus) septentrionis var. *ovoides*: Leng, 1908, p. 42.

Brumoides ovoideus: Belicek, 1976, p. 320.

Exochomus desertorum Casey, 1899, p. 108.—Fall, 1901, p. 231.

Exochomus californicus var. *desertorum*: Leng, 1920, p. 217.

Brumus desertorum: Casey, 1908, p. 412.

Brumoides desertorum: Belicek, 1976, p. 320.

Exochomus (*Brumus*) *septrionis* var. *nevadensis* Leng, 1908, p. 42. **New Synonymy.**
Brumus hoguei nevadensis: Casey, 1908, p. 412.
Brumoides nevadensis: Chapin, 1965a, p. 239.

Diagnosis. Length 2.90 to 3.0 mm, width 1.60 to 2.40 mm. Form oval. The color pattern of this subspecies is quite variable as illustrated in Figure 495d–g; the dorsal surface is black except the background color of the elytron which is yellowish brown to red. Male genitalia as in *B. septrionis davisi*.

Discussion. The combination of black pronotal angle and propleuron, alutaceous elytron and elongate form distinguish *B. s. septrionis* from *B. s. hoguei* except where the two intergrade in Colorado, Nevada and Arizona. *B. s. septrionis* is similar to *B. s. davisi* except that the latter has coarse, obvious elytral punctation not seen in *septrionis*.

The names listed in the synonymy of this species have been variously treated as species, subspecies, aberrations, etc., by authors. I regard them as junior synonyms of *B. septrionis* because they simply represent color forms without geographical correlation. Belicek (1976) listed *B. ovoideus* as a junior synonym of *septrionis* but erroneously credited Gordon (1974a) as having established that synonymy. I here designate and label as the lectotype a female of *desertorum* in the USNM labeled "Nev./Type 35559/desertorum Casey". A second female with the same data is designated and labeled as a paralectotype. The type of *ovoideus* is a unique female with a locality label "Ind.". Casey (1899) listed this locality as "Indiana?". This specimen almost certainly did not come from Indiana and I previously (Gordon, 1976b) noted a similar instance of a species of *Scymnus* from the Casey collection with an identical label. In both instances the specimens in question must have been collected from somewhere in the western United States. A single type specimen of *nevadensis* Leng is in the USNM collection. I here designate and label this specimen labeled "C. W. Leng dedit/Reno, Nev. VII-18/U.S.N.M. Paratype 40403" as the lectotype.

Type locality. Of *septrionis*, Hudson Bay; of *ovoideus*, Indiana?; of *desertorum*, Nevada (lectotype here designated); of *nevadensis*, Reno, Nevada (lectotype here designated).

Type depository. Of *septrionis*, type not examined; of *ovoideus* and *desertorum*, USNM; of *nevadensis*, USNM.

Distribution. Figure 497. Hudson Bay to northern Arizona, west to Alaska and northern California.

Brumoides septrionis hoguei (Gorham)

Fig. 496a–d; Map, Fig. 497

Exochomus hoguei Gorham, 1894, p. 180.—Casey, 1899, p. 108.

Brumus hoguei: Weise, 1904, p. 358.—Casey, 1908, p. 409.—Korschefsky, 1932, p. 265.

Brumoides hoguei: Chapin, 1965a, p. 239.

Exochomus (*Brumus*) *orbiculatus* Leng, 1908, p. 41.—Korschefsky, 1932, p. 266.

New Synonymy.

Description as for typical *B. s. septrionis* with some variation (Fig. 496b–d), but typical examples of *B. s. hoguei* are only slightly elongate, with dorsal surface smooth, polished; pronotal angle and propleuron not black; ventral surface nearly

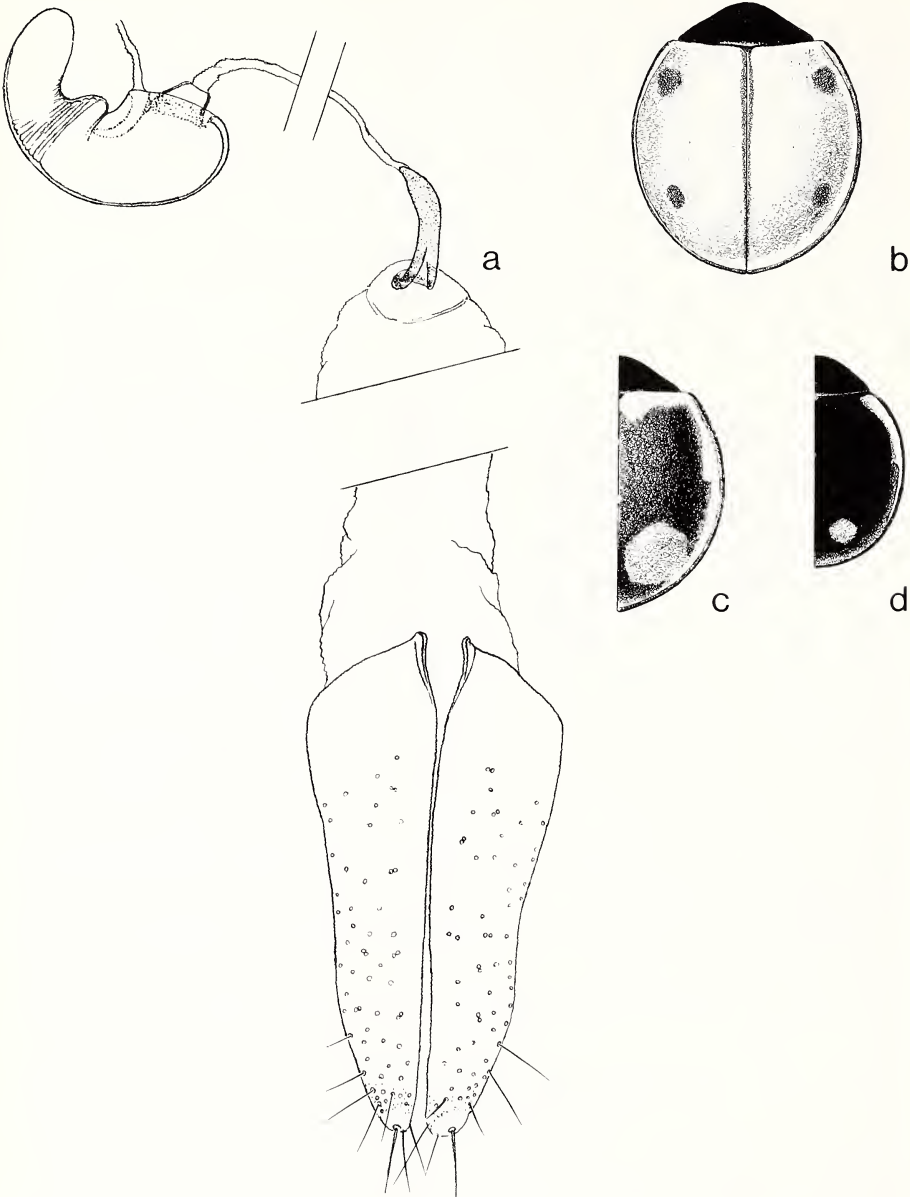


Fig. 496. *Brumoides septentrionis hogei*.

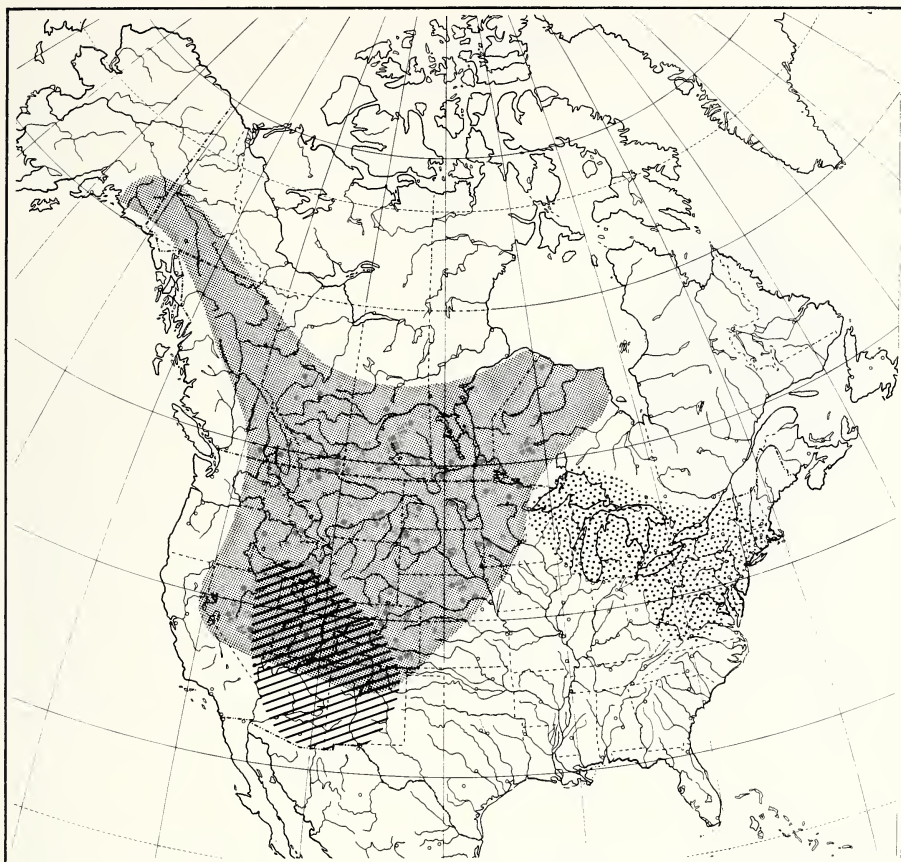


Fig. 497. Distribution. *Brumoides septentrionis septentrionis* (shaded, northern); *B. s. hogei* (cross hatch, southern); *B. s. davisi* (shaded, eastern).

always yellowish brown to brownish yellow. Male genitalia as in *B. septentrionis davisi*. Female genitalia as in Figure 496a.

The typical form occurs from Mexico and western Texas to Arizona. See discussion under *B. s. septentrionis*. I consider *E. (B.) orbiculatus* Leng a color variant of *B. s. hogei* and the name to be a junior synonym of that species. I here designate and label a female in the USNM collection labeled "Tucson, Ariz. July 13-15, 2300-2500 ft., Wickham/C.W. Leng dedit/U.S.N.M. Paratype 40404" the lectotype.

Type locality. Of *hogei*, Mexico, Villa Lerdo in Durango; of *orbiculatus*, Tucson, Arizona (lectotype here designated).

Type depository. Of *hogei*, BMNH; of *orbiculatus*, USNM.

Distribution. Figure 497. Colorado to west Texas, west to Idaho and Arizona.

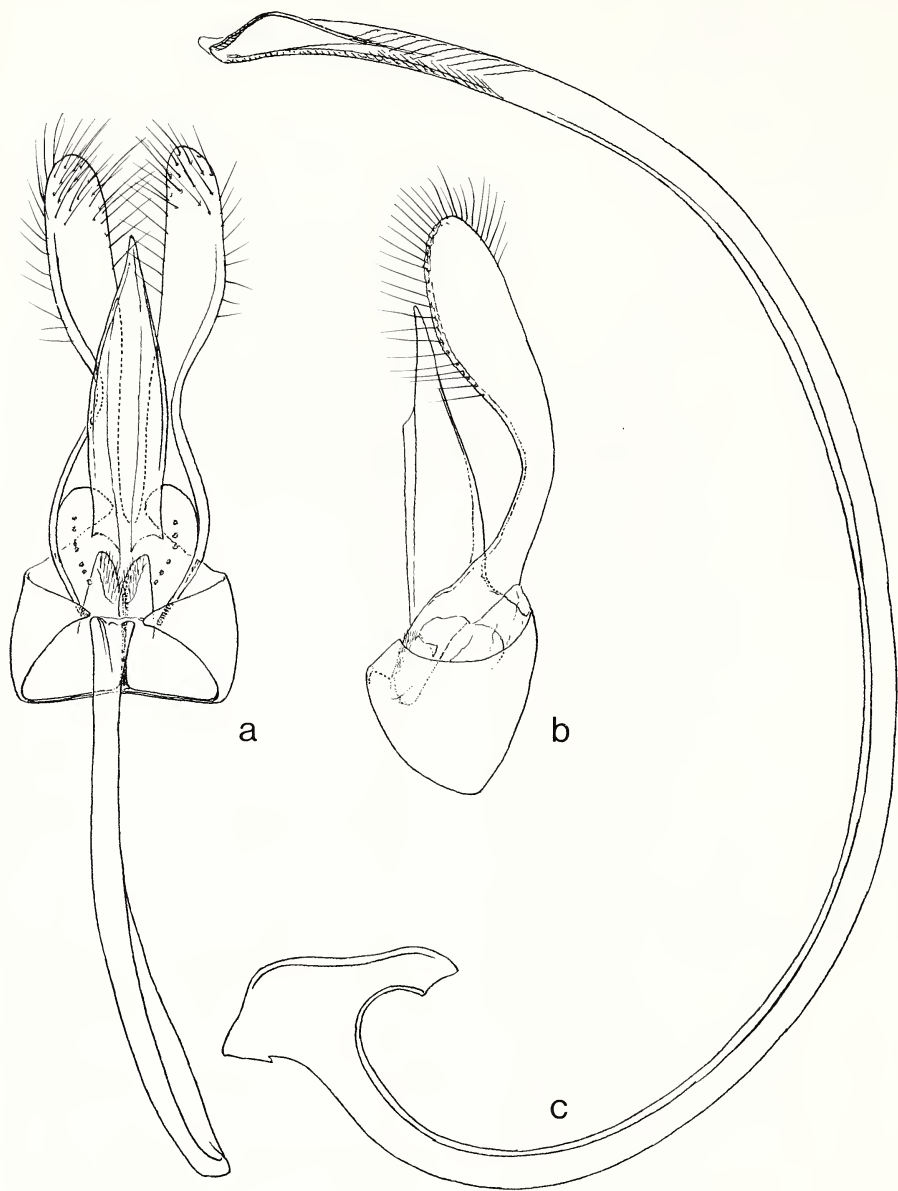


Fig. 498. *Brumoides septentrionis davisi* (male genitalia).

Brumoides septentrionis davisi (Leng)

Fig. 498a-c, 499a, b; Map, Fig. 497

Exochomus (*Brumus*) *septentrionis* var. *davisi* Leng, 1908, p. 42.—Casey, 1908, p. 412.—Korschefsky, 1932, p. 265.

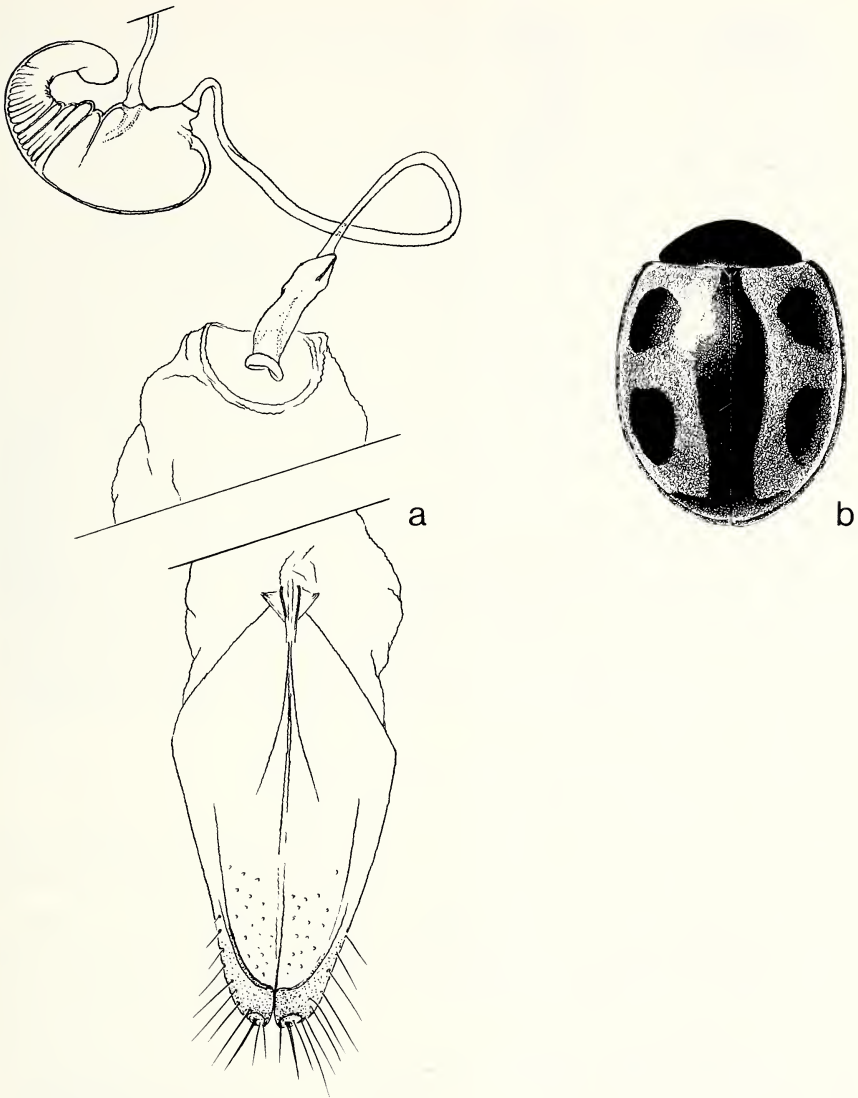


Fig. 499. *Brumoides septentrionis davisi* (female genitalia and habitus).

Brumus davisi: Wingo, 1952, p. 47.

Brumoides davisi: Chapin, 1965a, p. 239.

Description as for typical *B. s. septentrionis* except dorsal color pattern bolder with large, sometimes confluent, black areas (Fig. 499b); punctation on elytron coarser and denser than in *B. s. septentrionis*. Male genitalia as in Figure 498a–c. Female genitalia as in Figure 499a.

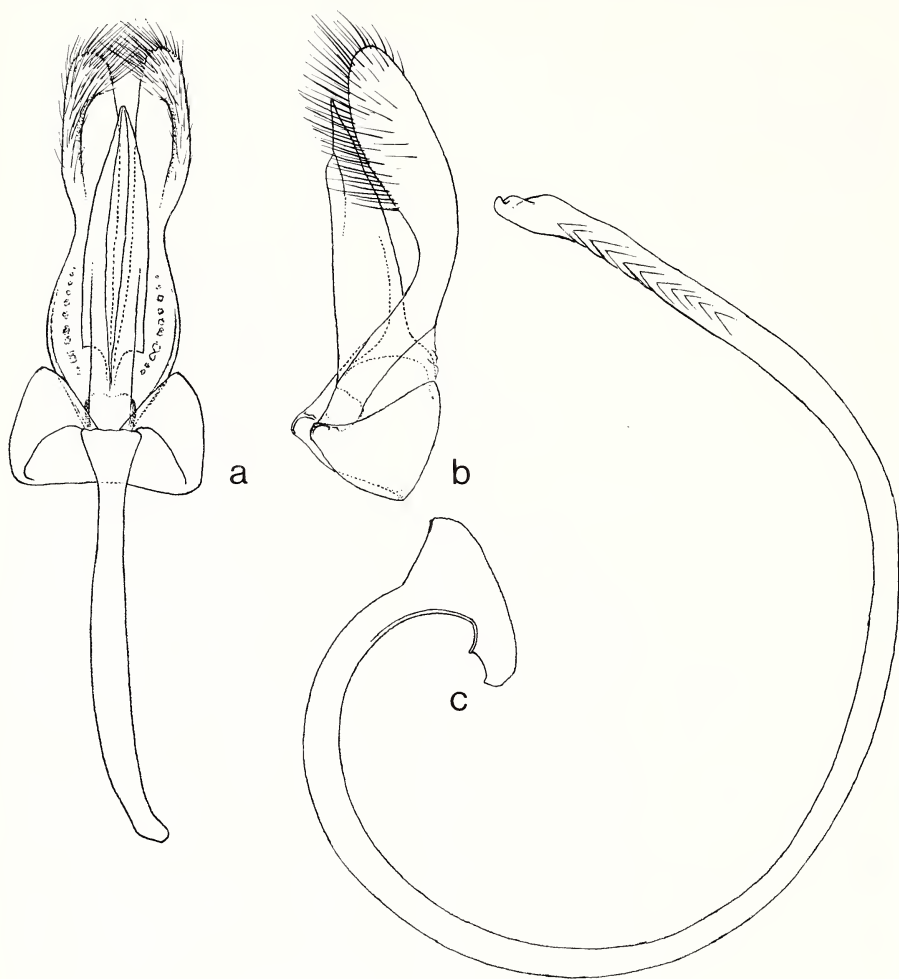


Fig. 500. *Brumoides histrio* (male genitalia).

Type locality. Washington, D.C.

Type depository. USNM.

Distribution. Figure 497. Southeastern Canada to Virginia, west to Minnesota.

Brumoides histrio (Fall)

Fig. 500a-c, 501a-d; Map, Fig. 502

Exochomus histrio Fall, 1901, p. 230.

Exochomus (Brumus) histrio: Leng, 1908, p. 43.

Brumus histrio: Casey, 1908, p. 412.

Brumoides histrio: Chapin, 1965a, p. 239.

Exochomus parvicollis Casey, 1908, p. 411.—Belicek, 1976, p. 320.

Exochomus (Brumus) parvicollis: Leng, 1920, p. 217.

Brumus septentrionis ab. *parvicollis* Korschevsky, 1932, p. 267.

Brumoides parvicollis: Chapin, 1965a, p. 239.—Belicek, 1976, p. 320 (as synonym of *B. septentrionis*).

Diagnosis. Length 2.75 to 4.0 mm, width 2.20 to 3.0 mm. Form rounded, slightly oval. Color pattern similar to those of *septentrionis*; typical pattern identical to *Exochomus californicus*, another pattern same as *B. hogei* (Fig. 501b–d). Male genitalia as in Figure 500a–c. Female genitalia as in Figure 501a.

Discussion. I am unable to separate *B. histrio* from *B. parvicollis* and so regard the latter name as a junior synonym as did Belicek (1976). The color pattern of *B. parvicollis* is the same as that of typical *B. histrio* and the genitalia are identical.

Fall stated that he had 4 types of *E. histrio* from near Pomona, California. Two of these remain in his collection, and I here designate a male labeled “Pom Cal Mts 6/25/95/M.C.Z. Type 24550 (red paper) as the lectotype. The other specimen is labeled “Pom Cal Mts 5/30/96/” and I designate it a paralectotype. A third type in the USNM labeled “Pom Cal Mts 1.6.92/3083/HC Fall Cotype No. 6678/*Exochomus histrio* Fall” is designated and labeled a paralectotype.

There are 2 females and a male in the type series of *B. parvicollis*, all labeled “St. George, Utah, July, Wickham/USNM 35566”; one female is here designated and labeled the lectotype, and the other 2 specimens as paralectotypes.

Type locality. Of *histrio*, Pomona, California (lectotype here designated); of *parvicollis*, St. George, Utah (lectotype here designated).

Type depository. Of *histrio*, MCZ; of *parvicollis*, USNM.

Distribution. Figure 502. Utah to Arizona and southern California.

Brumoides blumi (Nunenmacher)

Fig. 503a–c; Map, Fig. 502

Brumus blumi Nunenmacher, 1934b, p. 113.

Brumoides blumi: Gordon, 1974a, p. 4.

Diagnosis. Length 2.60 to 3.30 mm, width 1.90 to 2.75 mm. Form elongate (Fig. 503e). Dorsum entirely black; venter black except antenna and mouthparts yellowish brown. Male genitalia as in Figure 503a–c. Female genitalia as in Figure 503d.

Discussion. The species *B. blumi* most nearly resembles is *Exochomus townsendi* (see Gordon, 1974a).

Type locality. Moraga, Contra Costa Co., California.

Type depository. CAS.

Distribution. Figure 502. CALIFORNIA: Alameda Co., Oakland Hills; Contra Costa Co.; Berkeley; Gilroy Hot Springs; Paraiso Springs; Santa Clara Co.; Alum Rock Canyon; Santa Cruz Co.

Axion Mulsant

Exochomus (Axion) Mulsant, 1850, p. 477.

Axion: Crotch, 1874b, p. 191.—Gorham, 1892, p. 176.—Casey, 1899, p. 105.—

Leng, 1908, p. 34.—Leng, 1920, p. 25.—Chapin, 1965a, p. 242.—J. Chapin, 1974,

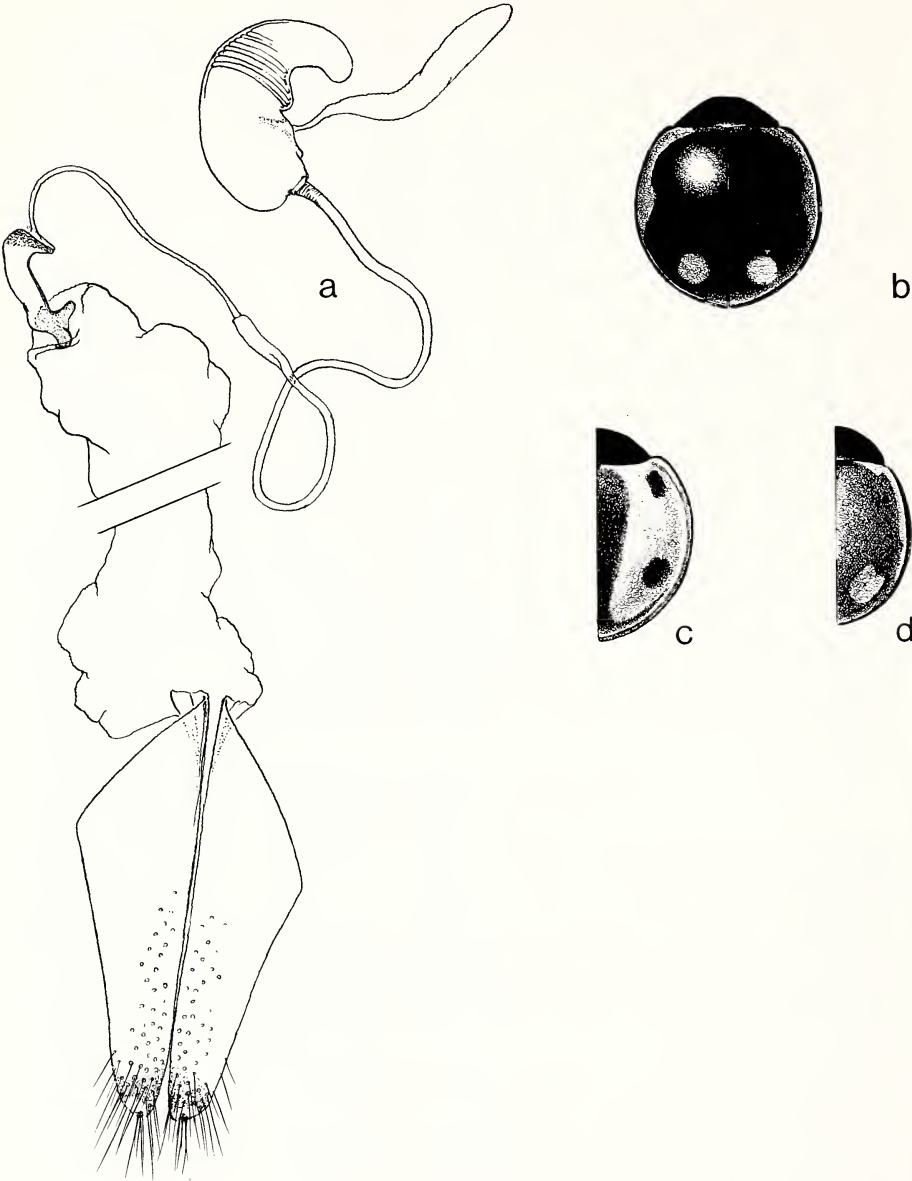


Fig. 501. *Brumoides histrio* (female genitalia, habitus and variation).

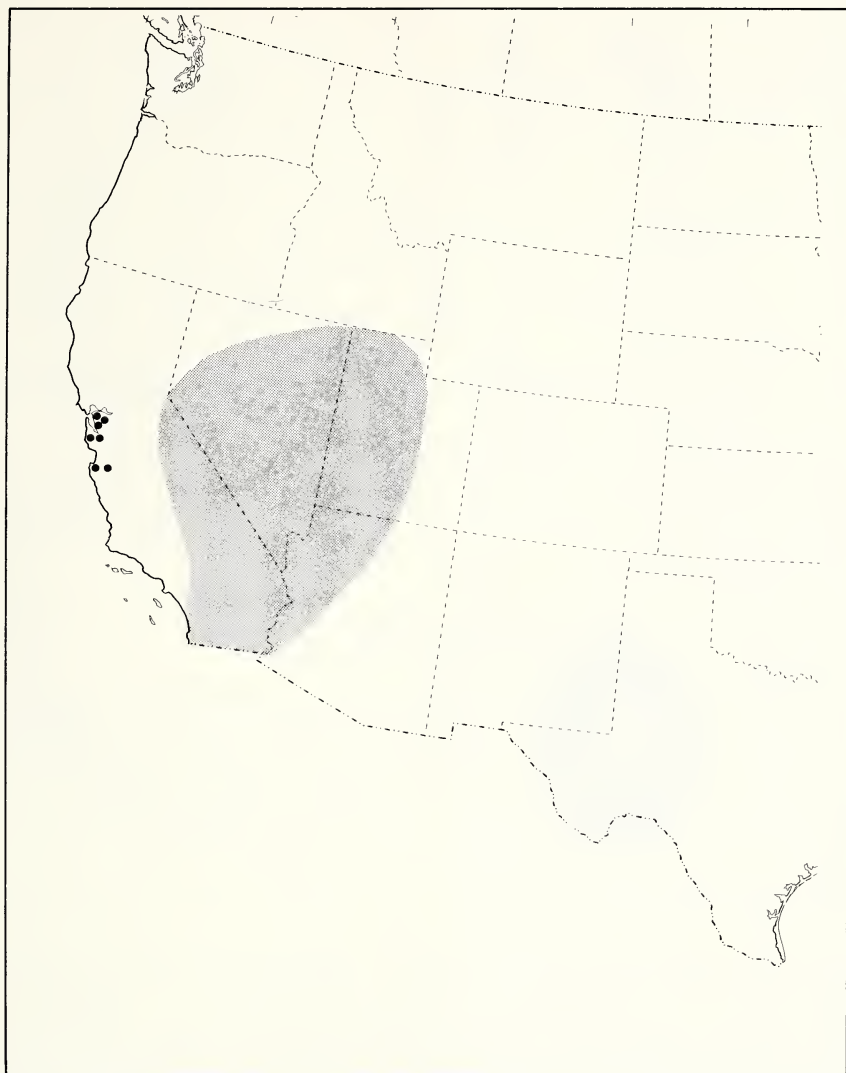


Fig. 502. Distribution. *Brumoides histrio* (shaded); *B. blumi* (dot).

p. 49. Type-species; *Coccinella tripustulata* Degeer, by subsequent designation of Crotch, 1873.

Chilocorini with form subcircular, size large, convex, dorsal surface glabrous. Antenna 10-segmented, club 3-segmented with apical segment deeply embedded in penultimate (Fig. 504a). Apical segment of maxillary palpus wider toward apex, apex strongly oblique. Prosternal lobe narrow, truncate at apex. Pronotum without fine

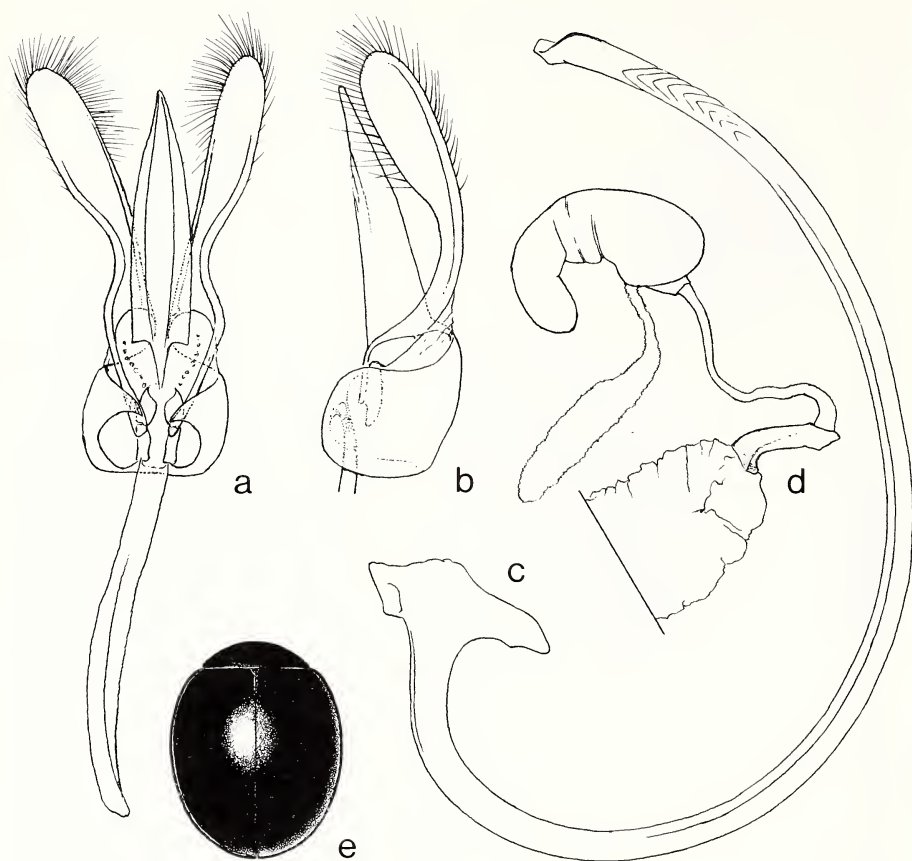


Fig. 503. *Brumoides blumi*.

marginal line across base. Elytron with lateral margin slightly reflexed; epipleuron with small foveae for reception of femoral apices. Abdomen with 6 visible sterna in male, 5 in female, male 5th sternum broadly emarginate at apex. Postcoxal line incomplete (Fig. 504c). Femur not enlarged; tibia slender; tarsal claw with strong, quadrate, plate-like basal tooth (Fig. 504b). Male genitalia with basal lobe long, slender, asymmetrical in apical third. Female genitalia with thick portion of spermatheca longer than thin portion; infundibulum present, Y-shaped (Fig. 505d).

Several specific names have been proposed within this genus by several authors, but I am able to recognize only 2 species that occur north of Mexico. As in some other genera in this tribe, the male and female genitalia are not distinctive for each species. *Axion* is apparently restricted in distribution to Mexico and the United States. Available host data indicates that members of this genus are scale predators. Specific host records are as follows: *Kermes pubescens* Bogue, *Quadraspidotus perniciosus* (Comstock).

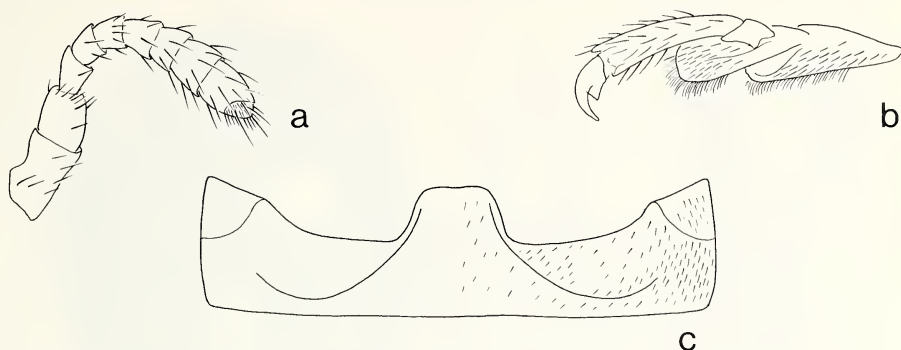


Fig. 504. *Axion* sp. a. Antenna. b. Tarsus. c. Postcoxal lines.

KEY TO SPECIES OF *Axion*

1. Lateral margin of elytron thickened into a distinct border; elytra nearly always with a pale spot on suture (Fig. 505e) *tripustulatum* (Degeer)
- Lateral margin of elytron not thickened; elytra without pale sutural spot (Fig. 507d) *plagiatum* (Olivier)

Axion tripustulatum (Degeer)

Fig. 505a–e; Map, Fig. 506

Coccinella 3-pustulata Degeer, 1775, p. 393.

Exochomus (Axion) tripustulatus: Mulsant, 1850, p. 478.

Exochomus tripustulatus Crotch, 1873, p. 376.

Axion tripustulatus: Crotch, 1874b, p. 191.

Axion tripustulatum: Casey, 1899, p. 106.—Leng, 1908, p. 34.—Korschefsky, 1932, p. 248.—Wingo, 1952, p. 47.—J. Chapin, 1974, p. 49.

Coccinella verrucatus Melsheimer, 1847, p. 180.

Axion verrucatus: Crotch, 1874b, p. 191.

Axion tripustulatum var. *verrucatus*: Leng, 1920, p. 217.

Axion incompletus Nunenmacher, 1911, p. 71.—Korschefsky, 1932, p. 248. **New Synonymy.**

Diagnosis. Length 5.0 to 7.0 mm, width 4.0 to 6.25 mm. Form rounded, slightly elongate. Color black except narrow pale area at anterolateral angle of pronotum, and elytron with red or yellow subhumeral spot and small, elongate sutural area behind middle (Fig. 505e). Lateral margin of elytron distinctly thickened into bead. Male genitalia as in Figure 505a–c. Female genitalia as in Figure 505d.

Discussion. The color pattern is very constant in this species but occasionally the pale sutural spot is absent, and it was one of these specimens that Nunenmacher (1911) named *A. incompletus*. I consider this name a junior synonym of *A. tripustulatum*. *Axion incompletus* was described from a holotype labeled "Lincoln Park Beach/Chicago Ill./Coll. by Wolcott/ /F. Knab/*Axion incompletus* Nun.".

The color pattern and presence of an elytral ridge distinguish *A. tripustulatum* from *plagiatum*, but the 2 species are also nearly allopatric (Fig. 506). *Axion tripustulatum*

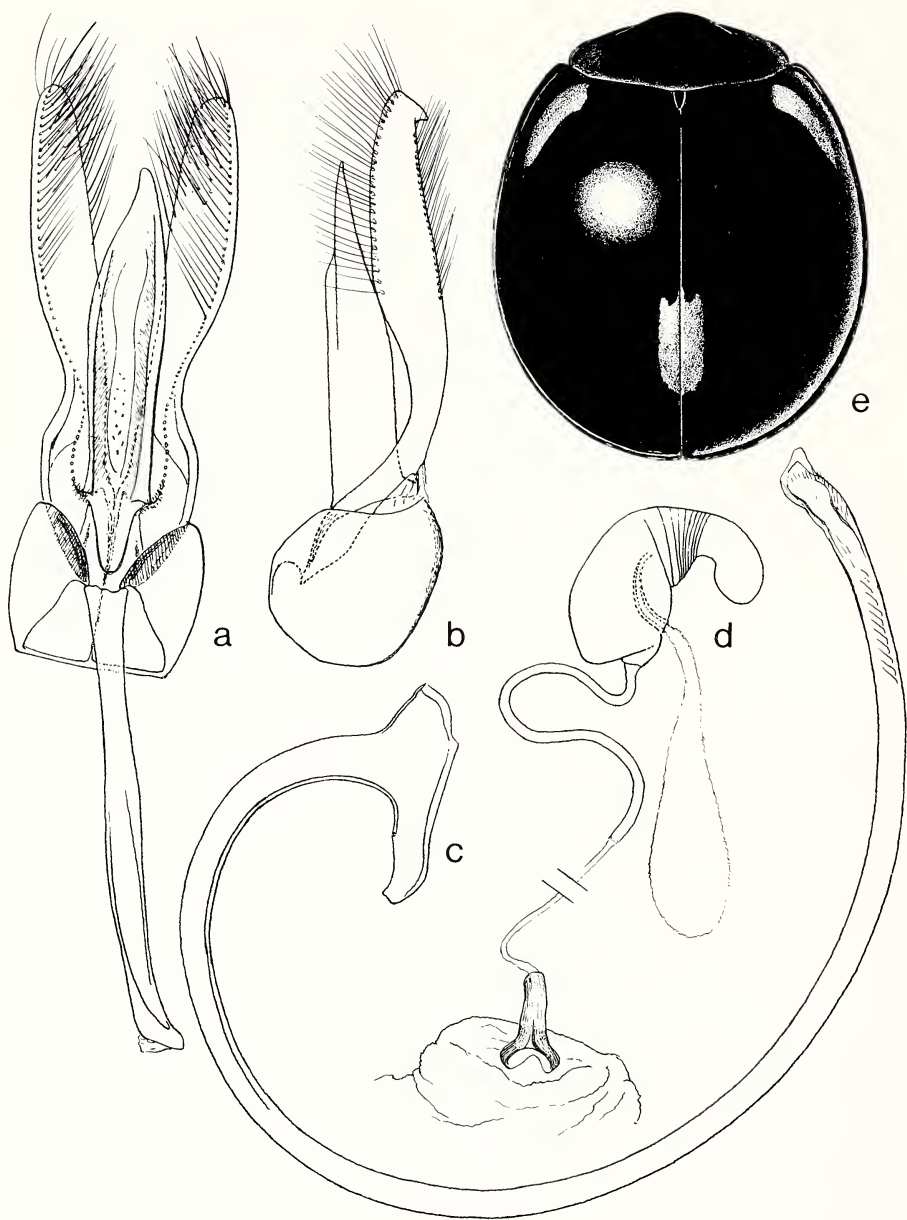


Fig. 505. *Axion tripustulatum*.

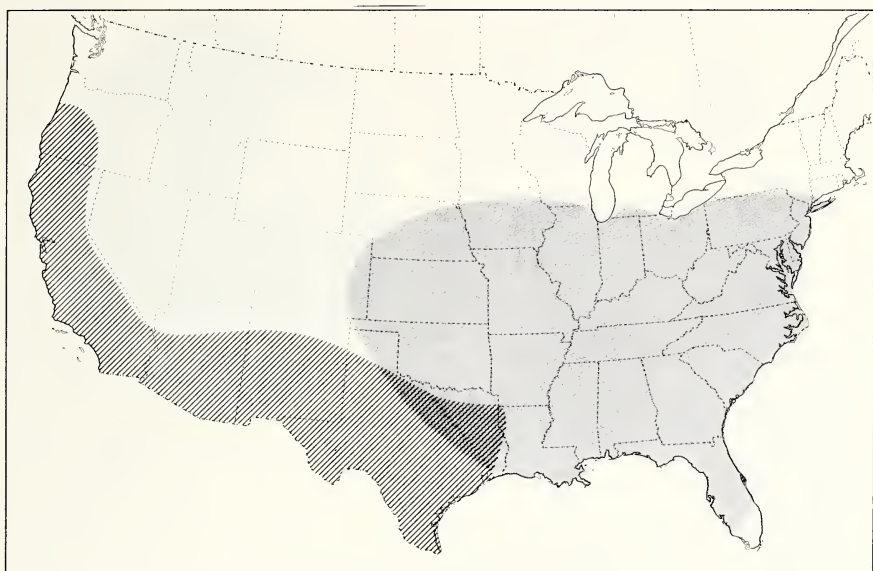


Fig. 506. Distribution. *Axion tripustulatum* (cross hatch, western); *A. plagiatus* (shaded, eastern).

is primarily an eastern species occurring as far west as Colorado and Texas, and *A. plagiatus* is a western species occurring from Louisiana and Texas west to the Pacific Coast.

Type locality. Of *tripustulatum*, "Pensylvania"; of *verrucatus*, Pennsylvania; of *incompletus*, Lincoln Park Beach, Chicago, Illinois.

Type depository. Of *tripustulatum*, type not examined; of *verrucatus*, type not located; of *incompletus*, CAS.

Distribution. Figure 506. New York to Florida, west to Colorado and Texas.

Axion plagiatus (Olivier)

Fig. 507a-d; Map, Fig. 506

Coccinella plagiata Olivier, 1808, p. 1044.

Exochomus (Axion) plagiatus: Mulsant, 1850, p. 477.

Axion plagiatus: Crotch, 1874b, p. 191.

Axion plagiatus: Casey, 1899, p. 106.—Leng, 1908, p. 34.—Korschefsky, 1932, p. 248.—Wingo, 1952, p. 47.—Hatch, 1961, p. 163.—J. Chapin, 1974, p. 50.

Exochomus (Axion) pilatii Mulsant, 1850, p. 478. **New Synonymy.**

Axion pilatii: Crotch, 1874b, p. 191.

Axion pilatei: Casey, 1899, p. 106.—Leng, 1908, p. 34.—Korschefsky, 1932, p. 248.

Exochomus texanus LeConte, 1858, p. 88.

Axion texanus: Crotch, 1874b, p. 191.—Casey, 1899, p. 166.—Casey, 1908, p. 409.

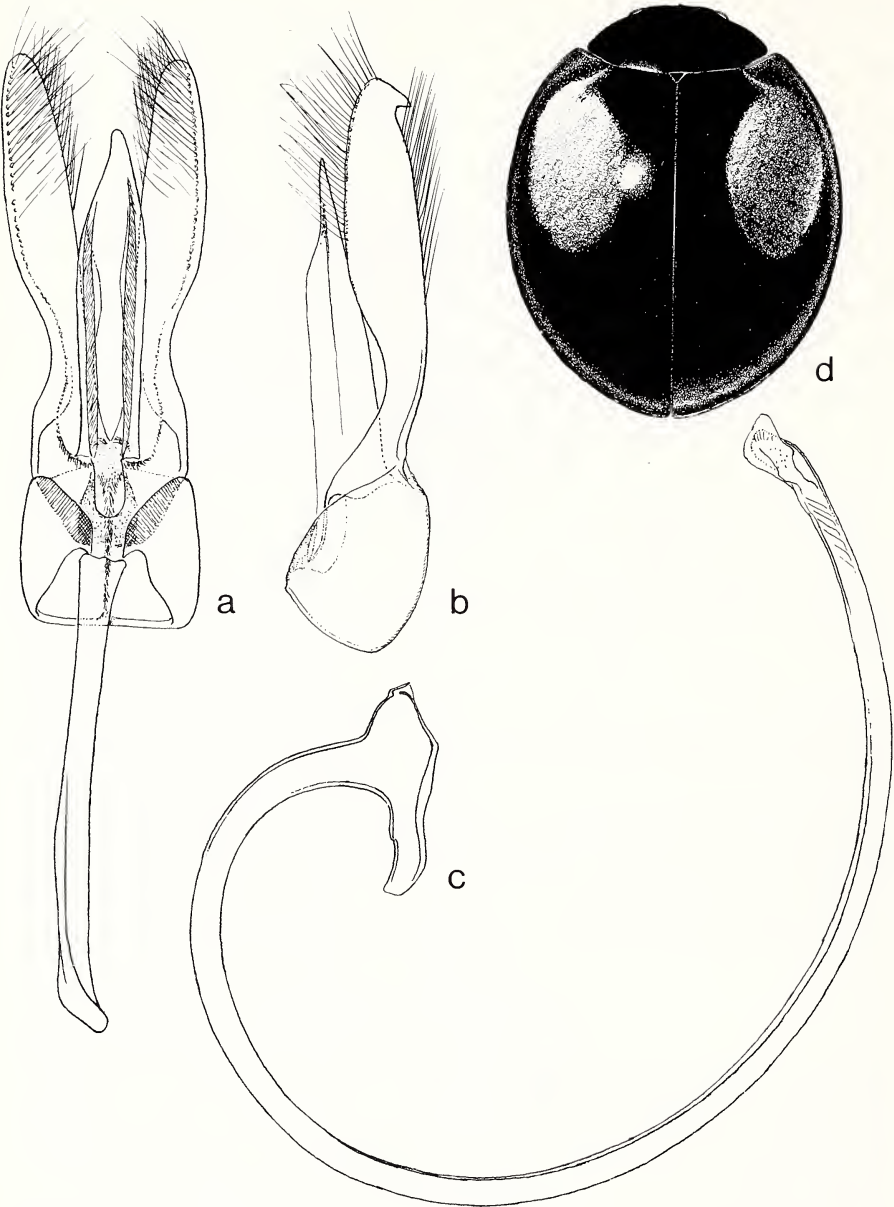


Fig. 507. *Axion plagiatum*.

Axion plagiatus var. *texanum*: Leng, 1908, p. 36.—Korschefsky, 1932, p. 248.

Chilocorus pleuralis LeConte, 1859a, p. 90.—Crotch, 1874b, p. 185.

Axion pleuralis: Casey, 1899, p. 106.—Casey, 1908, p. 409.

Axion plagiatus var. *pleurale*: Leng, 1908, p. 36.—Korschefsky, 1932, p. 248.

Axion alutaceum Casey, 1899, p. 106.—Korschefsky, 1932, p. 248.

Axion plagiatus var. *alutaceum*: Leng, 1908, p. 36.

Description as for *plagiatus* except elytron lacking sutural spot (Fig. 507). Male genitalia as in Figure 507a–c.

The size of the pale elytral areas varies as does the body form. At first glance it seems possible to segregate 2 or more species from what I here consider to be *A. plagiatus*. The principal characteristic involved in giving some specimens a different appearance is the degree to which the outer epipleural margin descends. In some specimens, principally from California, this margin does not descend vertically as in most examples, but descends somewhat obliquely. This gives the specimen a dorso-ventrally flattened appearance, however, when a large number of specimens from several localities are available for study, all degrees of epipleural explanation between the 2 extremes exist. The pale elytral spots are also extremely variable in size and shape, but I cannot detect any consistent pattern of variation. In the absence of genitalic differences or any consistent external morphological characters, I regard *A. plagiatus* as a somewhat polymorphic species. One form of *A. plagiatus* that is apparently restricted to the San Francisco Bay area of California is fairly distinctive in appearance. The elytral spots are small and light yellow rather than red. This is the only readily recognizeable variation of *A. plagiatus* that I have seen. LeConte specifically stated that he had one specimen of *E. texanus* when he described it, therefore the male in his collection labeled "(red disc)/male sign/Type 6693(red paper)/*E. pilatei* Muls. *texanus* Lec. *pleuralis* Lec." must be considered the holotype. It is not clear how many specimens LeConte had when he described *C. pleuralis*, therefore the female in his collection labeled "(gold disc)/Type 6694/*C. pleuralis* Rathv. Lec. is designated and labeled the lectotype. The type of *alutaceus* is a unique female (holotype) in the Casey collection.

Type locality. Of *plagiatus*, "les îles de la mer des Indes" (West Indies); of *pilatei*, not stated; of *texanum*, Texas; of *pleuralis*, California (lectotype here designated); of *alutaceum*, Las Vegas, New Mexico.

Type depository. Of *plagiatus*, type not examined; of *pilatei*, type not examined; of *texanum* and *pleuralis*, MCZ; of *alutaceum* (35554) USNM.

Distribution. Figure 506. Louisiana to Oregon and southern California.

Arawana Leng

Exochomus (*Arawana*) Leng, 1908, p. 34, 38.—Casey, 1908, p. 409.—Korschefsky, 1932, p. 245.

Arawana: Leng, 1920, p. 217.—Chapin, 1965a, p. 245. Type-species; *Exochomus arizonicus* Casey, by original designation of Leng, 1908.

Chilocorini with form broadly oval, strongly convex, dorsal surface glabrous. Antenna 10-segmented, club 3-segmented with apical segment embedded in apex of

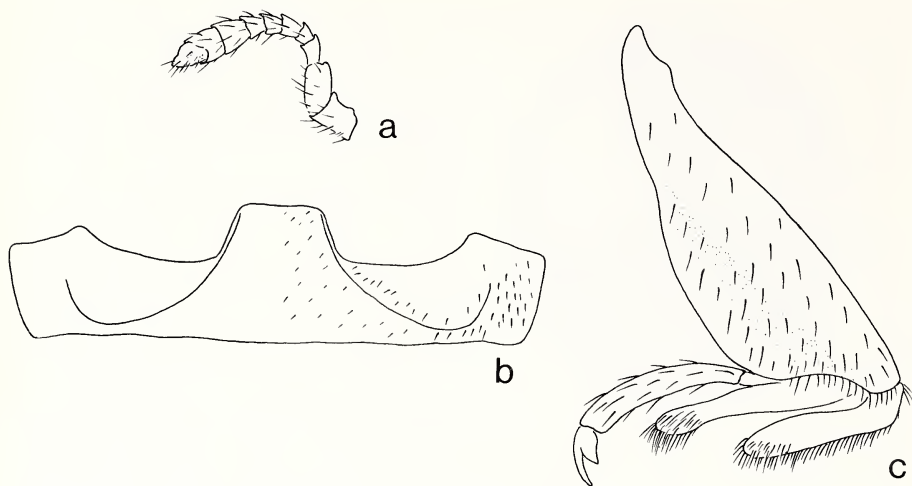


Fig. 508. *Arawana scapularis*. a. Antenna. b. Postcoxal lines. c. Front tibia and tarsus.

penultimate (Fig. 508a). Apical segment of maxillary palpus strongly securiform, apex oblique. Prosternal lobe broad, apex truncate. Elytral margins not reflexed, finely beaded; epipleuron foveolate for reception of femoral apices. Abdomen with 5 visible sterna in both sexes. Postcoxal line nearly complete (Fig. 508b). Anterior tibia with outer margin expanded into a thin keel (Fig. 508c); middle and hind tibiae with apical spurs; tarsal claw strong, abruptly bent, with triangular basal tooth (Fig. 508c). Male genitalia with basal lobe long, lanceolate; paramere with finger-like process at apex. Female genitalia with thick portion of sperm duct longer than thin portion; infundibulum present, Y-shaped (Fig. 509d).

Chapin (1965a) placed 3 species in this genus, one from Central America, one from Cuba, and the type-species, which is known only from Arizona.

I have not seen any host data for members of this genus, but they are most likely to be predators of scale insects.

Arawana arizonica (Casey)

Fig. 509a-e; Map, Fig. 510

Exochomus arizonicus Casey, 1899, p. 107.

Exochomus (Arawana) arizonica: Leng, 1908, p. 38.—Casey, 1908, p. 409.—Korschefsky, 1932, p. 245.

Arawana arizonica: Leng, 1920, p. 217.—Chapin, 1965a, p. 245.

Diagnosis. Length 3.25 to 3.50 mm, width 3.0 to 3.20 mm. Form nearly round. The generic characters separate *A. arizonica* from other North American chilocorines. The dorsal color pattern is basically black or piceous with an elongate red spot on each elytron (Fig. 509e). Male genitalia as in Figure 509a-c. Female genitalia as in Figure 509d.

Discussion. The presence of a keel on the anterior tibia and the finger-like process on the paramere are characteristics not found elsewhere in this subfamily. There are

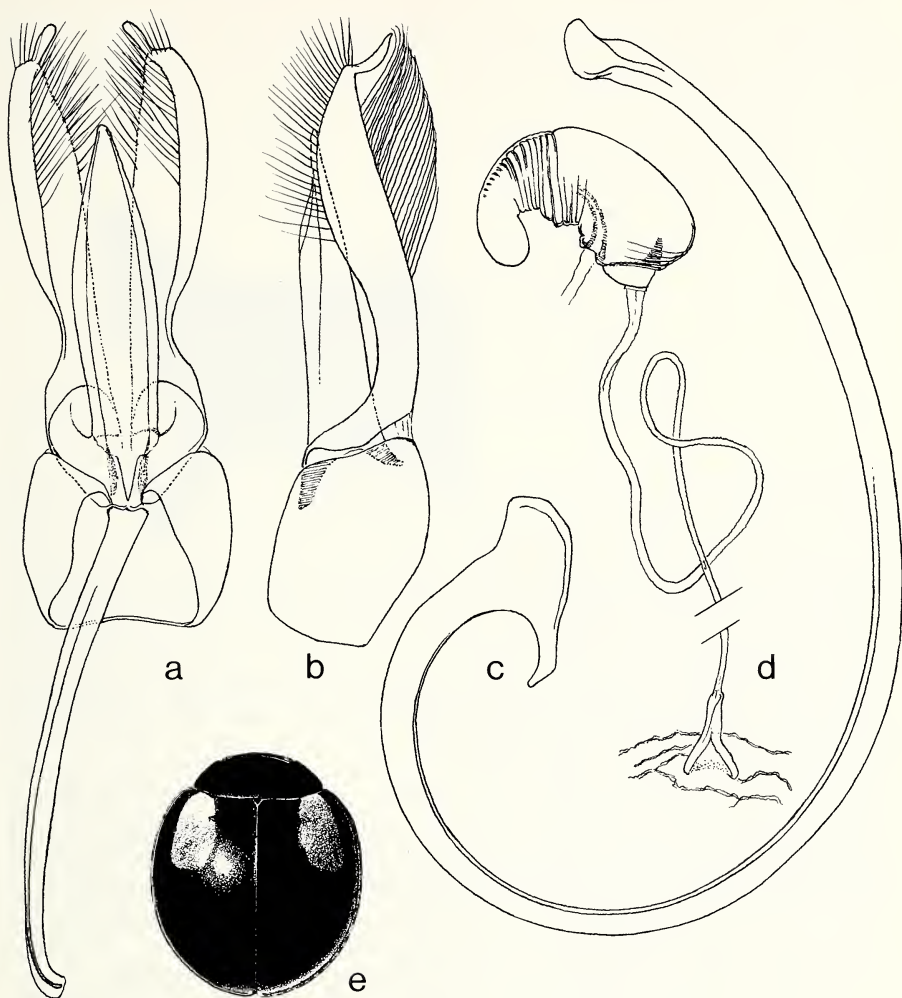


Fig. 509. *Arawana scapularis*.

2 type specimens of *E. arizonica* in the Casey collection, labeled "Ari.". I here designate and label one as the lectotype and one as a paralectotype.

Type locality. Arizona (lectotype here designated).

Type depository. USNM (35555).

Distribution. Figure 510. ARIZONA: Catalina Springs; Santa Rita Mts.

Exochomus Redtenbacher

Exochomus Redtenbacher, 1843, p. 11.—Mulsant, 1850, p. 476.—Crotch, 1873, p. 376.—Crotch, 1874b, p. 192.—Casey, 1899, p. 106.—Barovsky, 1922, p. 293.—Korschevsky, 1932, p. 25.—Wingo, 1952, p. 25.—Chapin, 1965a, p. 247.—J. Chap-

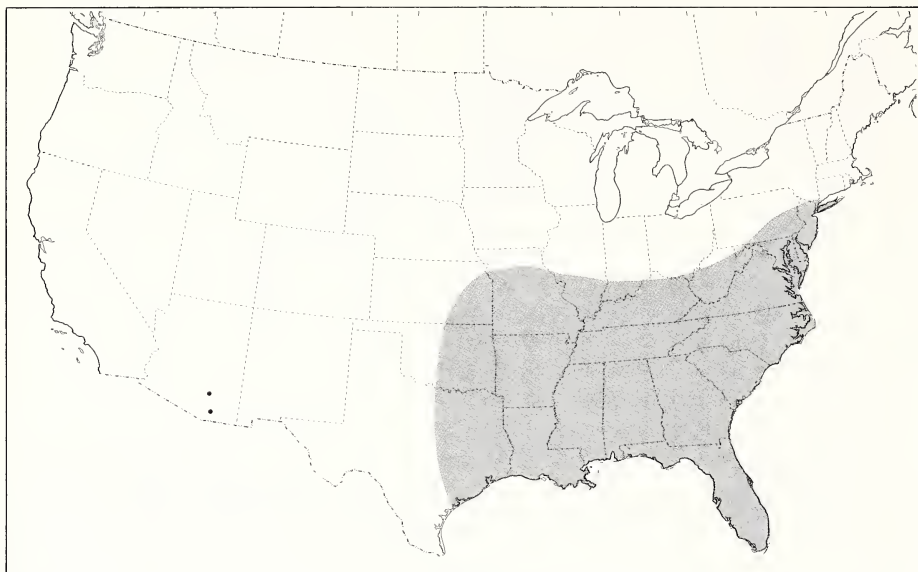


Fig. 510. Distribution. *Arawana arizonica* (dot); *Exochomus marginipennis* (shaded).

in, 1974, p. 51.—Belicek, 1976, p. 319. Type-species; *Coccinella 4-pustulata* L., by subsequent designation of Korschefsky, 1932.

Exochomus (*Exochomus*): Leng, 1908, p. 39.

Chilocorini with form broadly oval to almost round; upper surface glabrous or pubescent. Antenna 10-segmented; last 3 segments forming a slender fusiform club, 10th segment embedded in 9th (Fig. 511a). Terminal segment of maxillary palpus subsecuriform, apex strongly oblique. Prosternal lobe narrow, truncate at apex, anterior coxae nearly contiguous. Pronotum finely margined across base, lateral margin slightly reflexed. Elytral margin strongly beaded, epipleuron not foveolate for reception of femoral apices. Abdomen with 6 visible sterna in male, 5 in female. Postcoxal line complete or nearly so (Fig. 511b). Leg with robust femora, tibia slender, tarsal claw with subquadrate basal tooth (Fig. 511c). Male genitalia with basal lobe asymmetrical. Female genitalia with long sperm duct; infundibulum present (Fig. 512d).

Exochomus is distributed worldwide with 10 representatives in the United States and Canada, 3 of which have been introduced as biocontrol agents. Three of the native species are readily recognizable and seem to represent clearly defined taxa. Another species, *E. subrotundus*, is also not likely to be confused with anything else but does bear some resemblance to *E. marginipennis* and related taxa. *Exochomus marginipennis* and *E. childreni* contain a complex assemblage of forms and I am not convinced that the classification presented herein is entirely accurate. Previous authors have shuffled species and subspecies in various ways, but the arrangement presented here seems the most logical at the present time. Specific host data records are as follows. Aphids; *Aphis pomi* Degeer, *Eriosoma lanigerum* (Hausmann), *Tox-*

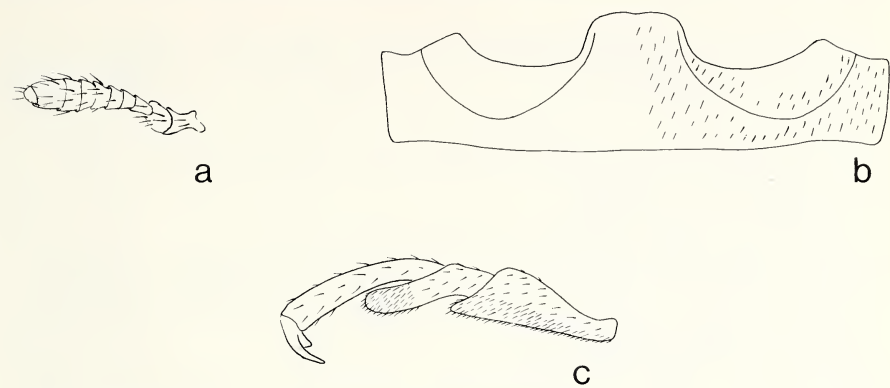


Fig. 511. *Exochomus* sp. a. Antenna. b. Postcoxal lines.

optera aurantii (Boyer de Fonscolombe). Scales; *Aonidiella aurantii* (Maskell), *Aonidiella taxus* Leonardi, *Asterolecanium coffeae* Newstead, *Asterolecanium miliaris* (Boisduval), *Asterolecanium bambusae* (Boisduval), *Ceroplastes rusci* (L.), *Ceroplastes sinensis* (Del Guercio), *Chionaspis furfura* (Fitch), *Chionaspis minor* Maskell, *Chionaspis salicis* (L.), *Chrysomphalus dictyospermi* (Morgan), *Chrysomphalus aonidium* (L.), *Coccus viridis* (Green), *Cryptococcus fagisuga* Lindinger, *Dactylopius opuntiae* (Cockerell), *Eulecanium tiliae* (L.), *Filippia oleae* (Costa), *Hemiberlesia lataniae* (Signoret), *Lepidosaphes beckii* (Newman), *Lepidosaphes gloverii* (Packard), *Parthenolecanium corni* (Bouche), *Parlatoria camelliae* Comstock, *Parlatoria oleae* (Colvee), *Pinnaspis buxi* (Bouche), *Planococcus citri* (Risso), *Planococcus lilacinus* (Cockerell), *Pollinia pollini* (Costa), *Pulvinaria floccifera* (Westwood), *Pseudaulacaspis pentagona* (Targioni-Tozzeti), *Pseudoparlatoria ostreata* Cockerell, *Quadraspidotus marani* Zahradnik, *Quadraspidotus ostreaeformis* (Curtis), *Saissetia oleae* (Olivier), *Ischnaspis longirostris* (Signoret), *Situlaspis yuccae* (Cockerell), *Sphaerolecanium prunastri* (Boyer de Fonscolombe), *Toumeyella liriodendri* (Gmelin), *Unaspis citri* (Comstock), *Unaspis yanonensis* (Kuwana).

KEY TO SPECIES OF *Exochomus*

- 1. Dorsal surface including pronotum completely black 2
- Dorsal surface not completely black 3
- 2(1). Form rounded (Fig. 518e); lateral margin of elytron strongly explanate
..... *aethiops* (Bland)
- Form elongate (Fig. 520e); lateral margin of elytron weakly explanate
..... *townsendi* Casey
- 3(1). Elytron metallic green, pubescent; California *metallicus* Korschefsky
- Elytron not metallic green, not pubescent; California and elsewhere 4
- 4(3). Elytron entirely black; pronotum black with large, yellow spot on anterolateral angle (Fig. 525e) *flavipes* (Thunberg)
- Elytron never entirely black; pronotal color pattern variable 5
- 5(4). Elytron black with humeral area and spot on apical ½ of elytron yellow or orange (Fig. 522b) 6
- Elytral color pattern not as above 7

- 6(5). Pronotum entirely black; elytron with spot near apex (Fig. 522b) . . . *californicus* Casey
 – Pronotum with marginal bead extremely narrowly yellow; elytron with spot just behind middle (Fig. 523e) *quadripustulatus* (L.)
- 7(5). Elytral suture without median pale area (Fig. 517e); west Texas to Utah and California *subrotundus* Casey
 – Elytral suture with pale median area (Fig. 516d, e); California or eastern North America west to central Texas 8
- 8(7). Known only from California *fasciatus* Casey
 – Known only from eastern North America to central Texas 9
- 9(8). Form elongate; elytral punctation coarse, distinct; dorsal color patterns as in Figure 512e–h *marginipennis* (LeConte)
 – Form rounded; elytral punctation fine, nearly obsolete, dorsal color patterns as in Figures 513a, b; 514a, b 10
- 10(9). Male with pronotal margin and leg yellow; Louisiana, southern Texas
 *childreni guexi* LeConte
 – Male with pronotal margin and leg dark as in female; Florida
 *childreni childreni* Mulsant

Exochomus marginipennis (LeConte)

Fig. 512a–h; Map, Fig. 510

Coccinella marginipennis LeConte, 1824, p. 173.

Exochomus marginipennis: Mulsant, 1850, p. 485.—Gorham, 1894, p. 177.—Crotch, 1873, p. 377.—Casey, 1899, p. 108.—Korschefsky, 1932, p. 263.—Wingo, 1952, p. 47.—J. Chapin, 1974, p. 51.

Coccinella praetextatus Melsheimer, 1847, p. 180.

Exochomus praetextatus: Mulsant, 1856, p. 149.—Crotch, 1874b, p. 193.

Exochomus latiusculus deflectens Casey, 1908, p. 410.—Korschefsky, 1932, p. 263.

New Synonymy.

Diagnosis. Length 2.50 to 3.60 mm, width 2.0 to 2.70 mm. Form oval, slightly flattened dorsoventrally. Male with anterolateral angle of pronotum and leg yellow, female with anterolateral angle of pronotum black or slightly pale, leg dark, concolorous with ventral surface; elytron typically reddish yellow with black maculae (Fig. 512g), variable (Fig. 512e, f, h). Elytral punctation coarse, dense; epipleuron nearly flat to obliquely or vertically descending externally. Male genitalia as in Figure 512a–c. Female genitalia as in Figure 512d.

Discussion. There are several color forms of what I consider to be *E. marginipennis* (Fig. 512e–h). The dark colored specimens are mostly restricted to the eastern and southeastern United States. Some specimens from northern Florida and Louisiana have the pale *childreni* pattern (Fig. 512h), and all specimens from Texas possess that pattern. These pale specimens also exhibit strong sexual dimorphism in that the male has large lateral and sometimes anterior pronotal areas and all legs yellow. The legs in the female are always dark and the pale lateral areas on the pronotum are usually reduced to just the anterolateral angle. In addition to changes in color pattern, a gradual change in body shape can be observed in a cline from New York to Florida and Alabama. This is a change in the form of the epipleuron from the obliquely descending type (New York) to a more strongly descending, almost vertical type (Florida). This also causes the body to appear more slender and elongate in dorsal

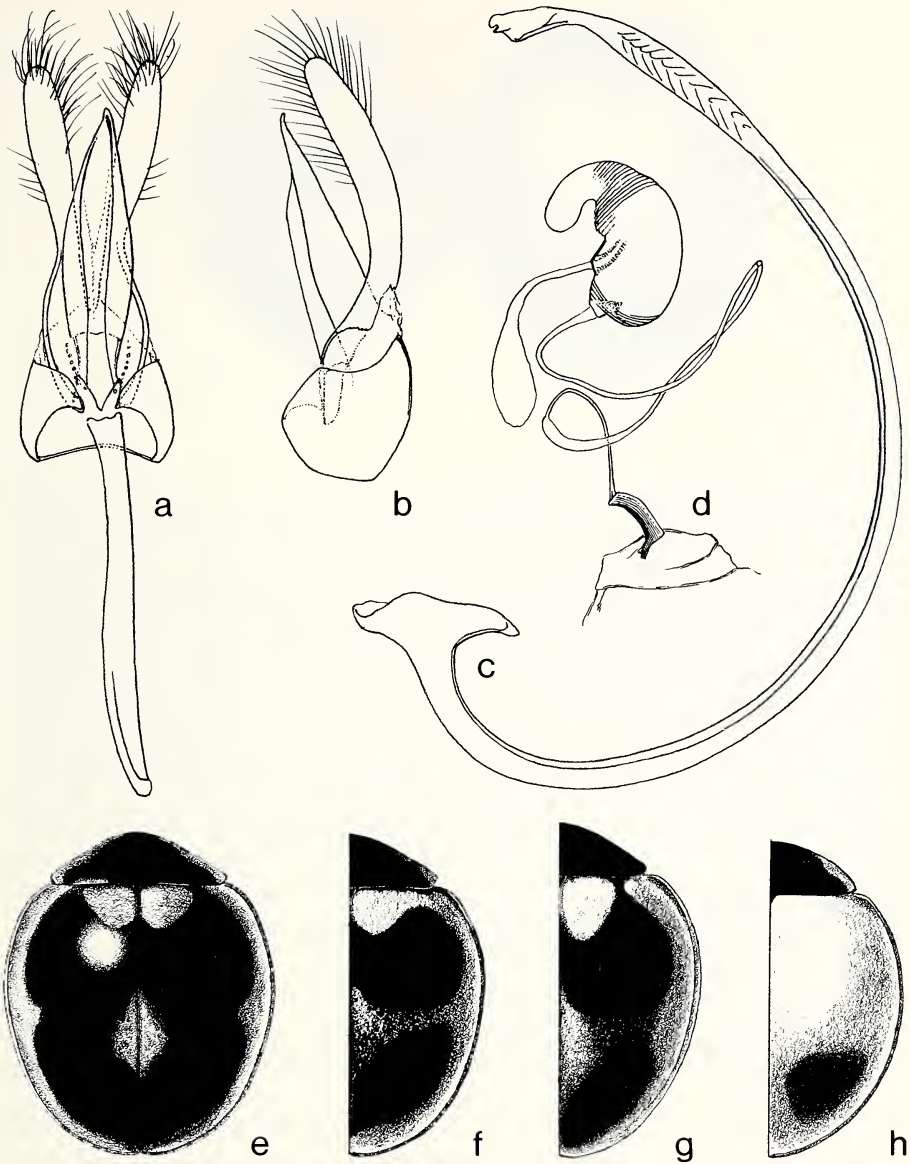


Fig. 512. *Exochomus marginipennis*.

view which, along with the coarse elytral punctation, distinguishes pale specimens of *E. marginipennis* from typical specimens of *E. childreni*. Because of the lack of genitalic differences I at first considered *E. childreni* as either a synonym or possible subspecies of *E. marginipennis*. However, I have examined specimens of both phe-

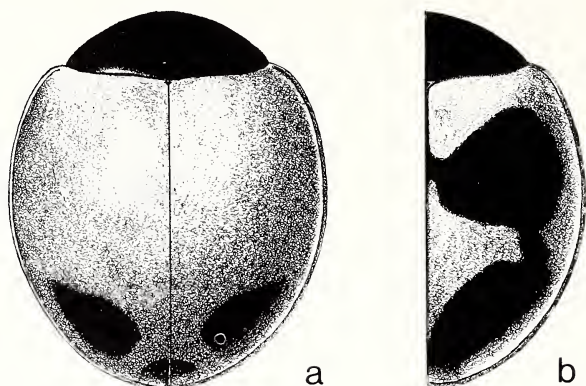


Fig. 513. *Exochomus childreni childreni*.

notypes collected together at Enterprise, Osceola, and Crescent City, Florida, which forces me to regard them as distinct entities. *Exochomus childreni* does not exhibit the secondary sexual dimorphism of *E. marginipennis* and is distinctly convex and round in form with the elytral punctures very fine, sparse, often nearly invisible. In addition, the elytral epipleuron is strongly descending externally in *E. childreni*, more so than in most specimens of *E. marginipennis*. The western form of *E. marginipennis*, which possesses the color pattern of *E. childreni*, is sometimes difficult to separate from that species, but if examples of both are present the distinction is usually apparent. *Exochomus deflectens* Casey is based on a single female from Missouri and cannot be maintained even as a subspecies. I here consider it a junior synonym of *E. marginipennis*. There are several specimens in the LeConte collection under the name *C. marginipennis*, but only 2 bear the orange disc indicative of the southern states. It is not apparent from the original description how many type specimens LeConte had, therefore I here designate and label a female labeled "(orange disc)/*E. marginipennis* (Lec.) *praetextus* Mels" the lectotype. The type or types of *C. praetextatus* Melsheimer are apparently no longer in existence, but there is no doubt that this species is *E. marginipennis*.

Type locality. Of *marginipennis*, Georgia (lectotype here designated); of *praetextatus*, Pennsylvania; of *deflectens*, Missouri.

Type depository. Of *marginipennis*, MCZ; of *praetextatus*, not located; of *deflectens*, USNM (35565).

Distribution. Figure 510. New York to Florida, west to Kansas and eastern Texas.

Exochomus childreni childreni Mulsant

Fig. 513a, b; Map, Fig. 515

Exochomus childreni Mulsant, 1850, p. 1035.—Crotch, 1873, p. 377.—Crotch, 1874b, p. 193.—Casey, 1899, p. 108.—Casey, 1908, p. 410.

Exochomus marginipennis var. *childreni*: Leng, 1908, p. 39.—Leng, 1920, p. 217.

Diagnosis. Length 2.80 to 3.60 mm, width 2.30 to 3.0 mm. Form rounded, slightly oval, strongly convex. Pronotum and head black; elytron yellowish red except black

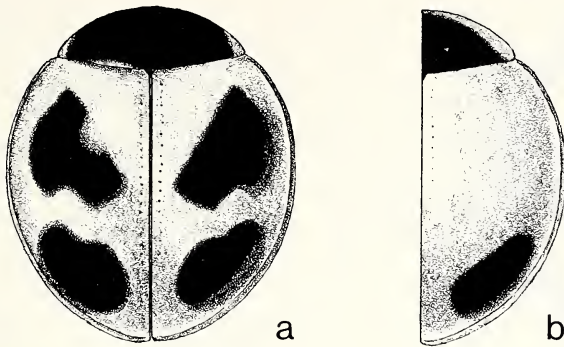


Fig. 514. *Exochomus childreni guexi*.

spot subapically (Fig. 513a), variable (Fig. 513b). Elytral punctures fine, sparse, nearly obsolete; epipleuron abruptly descending externally. Male and female genitalia not separable from those illustrated for *marginipennis*.

Discussion. *E. c. childreni* appears to be restricted to Florida where the normal color form cannot be confused with that of any other coccinellid. The 4-spotted or 4-banded forms however, resemble *E. marginipennis* which also occurs in Florida. See discussion under *marginipennis*. One "Cotype" exists in the BM collection, another in the Oxford University collection, not examined (R. D. Pope, pers. comm.).

Type locality. Florida.

Type depository. Lectotype not designated.

Distribution. Figure 515. FLORIDA: Apopka; Biscayne; Clay Co.; Crescent City; Dundee; Dunedin; Enterprise; Estero; Ft. Myers; Gainesville; Haulover; Hudson; Interlachen; Key West; Lake Co.; Miami; Orange Co.; Orlando; Osceola; Pinellas; St. Petersburg; Tampa.

Exochomus childreni guexi LeConte, new combination

Fig. 514a, b; Map, Fig. 515

Exochomus guexi LeConte, 1852, p. 132.—Crotch, 1874b, p. 193.

Exochomus marginipennis var. *guexi*: Leng, 1920, p. 217.

Exochomus latiusculus Casey, 1899, p. 108.—Casey, 1908, p. 410.—Korschefsky, 1932, p. 264.

Exochomus marginipennis var. *latiusculus*: Leng, 1908, p. 40.—Leng, 1920, p. 217.

This subspecies exhibits the major color patterns of *E. c. childreni* (Fig. 514a, b), and also the same secondary sexual dimorphism described for *E. marginipennis*. The genitalia are not separable from those illustrated for *E. marginipennis*.

In spite of the lack of specimens from the area between Florida and Louisiana, I consider *E. guexi* a subspecies of *E. childreni* rather than a distinct species. The apparent difference between *E. c. guexi* and *E. c. childreni* is the striking sexual dimorphism exhibited by *E. c. guexi*, in other morphological respects they appear to be extremely similar. There are 5 type specimens of *E. latiusculus*, all labeled "Brownsville, Texas, Wickham". One female is here designated and labeled the

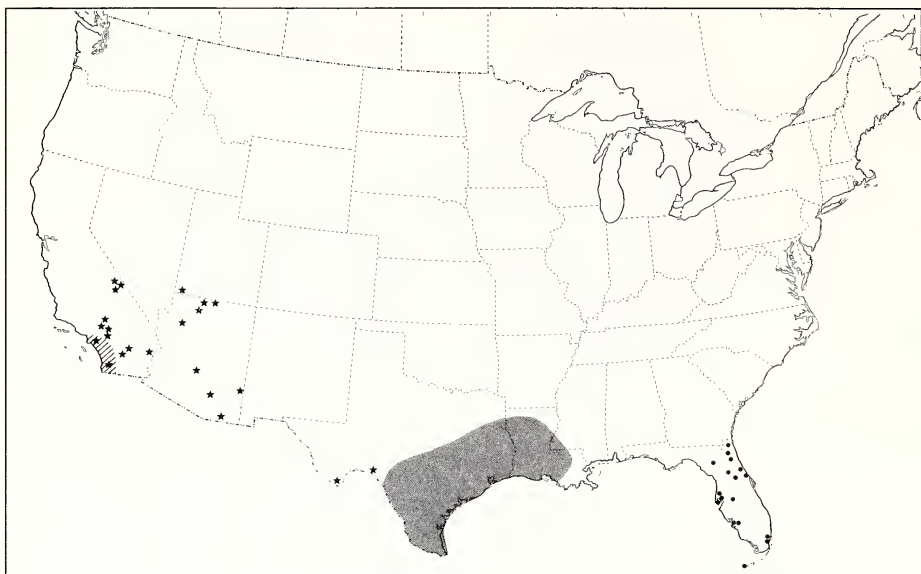


Fig. 515. Distribution. *Exochomus childreni childreni* (dot); *E. c. guexi* (shaded, Texas); *E. fasciatus* (shaded, California); *E. subrotundus* (open circle).

lectotype, the other 4 specimens are designated and labeled as paralectotypes. *Exochomus guexi* has been considered a synonym of *E. childreni* by previous authors but I believe a subspecific ranking is justified. There are 4 specimens of this species in the LeConte collection, all of which I consider types. One pin bears 2 males labeled "(orange disc)/Type 6695 (red paper)/*E. guexi* LeC.". I here designate the first male marked with a red dot on the point as the lectotype and the other male as a paralectotype. The second pin bears a male and a female, both of which I designate as paralectotypes. LeConte specifically stated that these specimens were from Louisiana.

Type locality. Of *guexi*, Louisiana (lectotype here designated); of *latiusculus*, Brownsville, Texas (lectotype here designated).

Type depository. Of *guexi*, MCZ; of *latiusculus*, USNM (35564).

Distribution. Figure 515. Louisiana. Southern Texas.

Exochomus fasciatus Casey

Fig. 516a-e; Map, Fig. 515

Exochomus fasciatus Casey, 1899, p. 108.—Leng, 1908, p. 40.—Casey, 1908, p. 412.

Exochomus marginipennis ab. *fasciatus*: Weise, 1904, p. 359.—Leng, 1920, p. 217.—Korschefsky, 1932, p. 264.

Diagnosis. Length 2.60 to 3.70 mm, width 2.20 to 2.80 mm. Form distinctly elongate. Color pattern similar to that of *E. marginipennis* (Fig. 516d), or reduced to that of typical *E. childreni* (Fig. 516e). Dorsal surface smooth, polished, punctures nearly invisible; epipleuron weakly descending externally. Male genitalia as in Figure 516a-c.

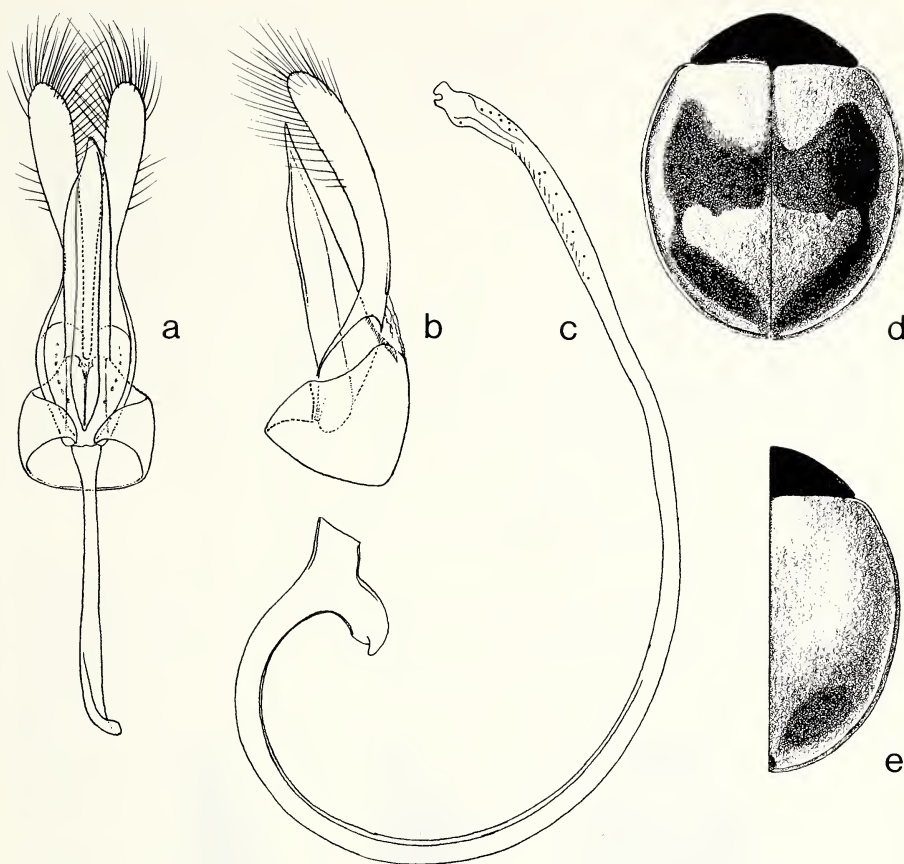


Fig. 516. *Exochomus fasciatus*.

Discussion. *Exochomus fasciatus* does not exhibit the secondary sexual dimorphism described for *E. marginipennis* and *E. c. guexi*; both male and female have dark legs and uniformly dark pronota. The elongate body form and highly polished dorsal surface characterize *fasciatus* and serve to separate it from *E. marginipennis* and *E. c. guexi*. I have not seen specimens of *E. fasciatus* from anywhere other than California, nor have I seen examples of *E. marginipennis* or *E. c. guexi* from the region between California and Texas.

There are 6 type specimens of *fasciatus* in the Casey collection. A male labeled "Cal" is here designated and labeled lectotype. The remaining 5 specimens variously labeled "Cal", "Pasadena, Cal, Fall", "Apr., Los Angeles Co. Cal", are designated and labeled as paralectotypes.

Type locality. California, San Diego (lectotype here designated).

Type depository. USNM (35562).

Distribution. Figure 515. Southern California.

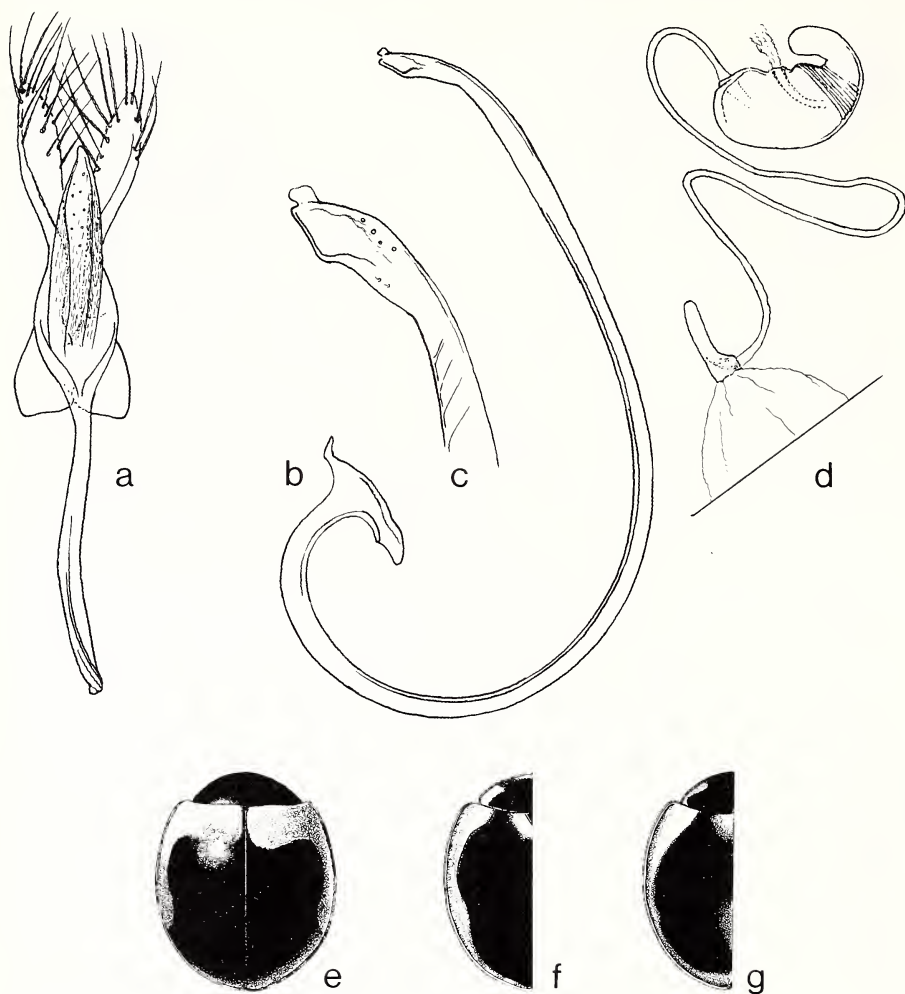


Fig. 517. *Exochomus subrotundus*.

Exochomus subrotundus Casey

Fig. 517a-g; Map, Fig. 515

Exochomus subrotundus Casey, 1899, p. 108.—Casey, 1908, p. 412.—Leng, 1920, p. 217.—Korschefsky, 1932, p. 264.

Exochomus fasciatus var. *subrotundus*: Leng, 1908, p. 40.

Diagnosis. Length 2.70 to 3.40 mm, width 2.30 to 2.80 mm. Form round, convex. Head and pronotum black, sometimes clypeus and anterolateral pronotal angle yellow; elytron dark brown or black with lateral border and basal spot beside suture yellow or orange (Fig. 517f), or with both basal and apical areas yellow (Fig. 517c, g); ventral surface brown or black except epipleuron yellow or orange. Dorsal surface

smooth, polished; epipleuron abruptly descending externally. Male genitalia as in Figure 517a–c. Female genitalia as in Figure 517d.

Discussion. Except for the entirely black species of *Exochomus*, *E. subrotundus* is the most easily recognized member of this genus because the body shape is like that of *Brumoides hoguei* or *B. histrio*. The distribution of *E. subrotundus* apparently does not overlap that of either *E. fasciatus* or *E. marginipennis*, but does overlap that of *E. aethiops*.

The type of *E. subrotundus* is a unique (holotype) male in the Casey collection.

Type locality. Texas, El Paso.

Type depository. USNM (35563).

Distribution. Figure 515. ARIZONA: Coconino Co., Page; Duncan; Grand Canyon; Huachucha Mts.; Peach Springs; Tempe; Tucson. CALIFORNIA: Claremont; Independence; Inyo Co., Inyo Mts.; Inyo Co., Saline Valley; Joshua Tree; Kern Co., Hobo Hot Springs; Kern Co., Tehachapi Pass; Mohave; Palmdale; Riverside Co., Black Hill; San Bernardino Co., Keys Ranch; San Diego Co., Warner Hot Spring; Vidal. TEXAS: Chisos Mts.; Terrell Co., Langtry. UTAH: Chad's Ranch.

Exochomus aethiops (Bland)

Fig. 518a–e; Map, Fig. 519

Coccinella aethiops Bland, 1864, p. 72.

Exochomus marginipennis var. *aethiops*: Crotch, 1873, p. 377.

Exochomus aethiops: Casey, 1899, p. 109.—Chapin, 1965a, p. 249.—Gordon, 1974a, p. 2.—Belicek, 1976, p. 320.

Exochomus (*Brumus*) *aethiops*: Leng, 1908, p. 41.

Brumus aethiops: Korschefsky, 1932, p. 265.—Hatch, 1961, p. 163.

Exochomus mormonicus Casey, 1908, p. 411.—Gordon, 1974a, p. 2.

Exochomus (*Brumus*) *aethiops* ab. *mormonicus*: Leng, 1920, p. 217.

Brumus aethiops ab. *mormonicus*: Korschefsky, 1932, p. 265.

Diagnosis. Length 3.0 to 4.20 mm, width 2.50 to 3.50 mm. Form rounded, convex (Fig. 518e). Color entirely black except antenna and mouthparts yellowish brown. Dorsal surface smooth, polished, punctures nearly invisible; epipleuron moderately descending externally, obliquely inclined. Male genitalia as in Figure 518a–c. Female genitalia as in Figure 518d.

Discussion. The rounded, very convex form, and strongly explanate lateral margin of the elytron are characters which will distinguish *E. aethiops* from *E. townsendi* which it most closely resembles. See Gordon (1974a) for further comments.

Type locality. Of *aethiops*, Rocky Mts., Colorado Territory; of *mormonicus*, Marysvale, Utah (lectotype designated by Gordon, 1974a).

Type depository. Of *aethiops*, PAS; of *mormonicus*, USNM (35556).

Distribution. Figure 519. South Dakota to New Mexico, west to Alberta, and southern California.

Exochomus townsendi Casey

Fig. 520a–e; Map, Fig. 519

Exochomus townsendi Casey, 1908, p. 411.—Korschefsky, 1932, p. 264.—Blackwelder, 1945, p. 451.—Gordon, 1974a, p. 2.

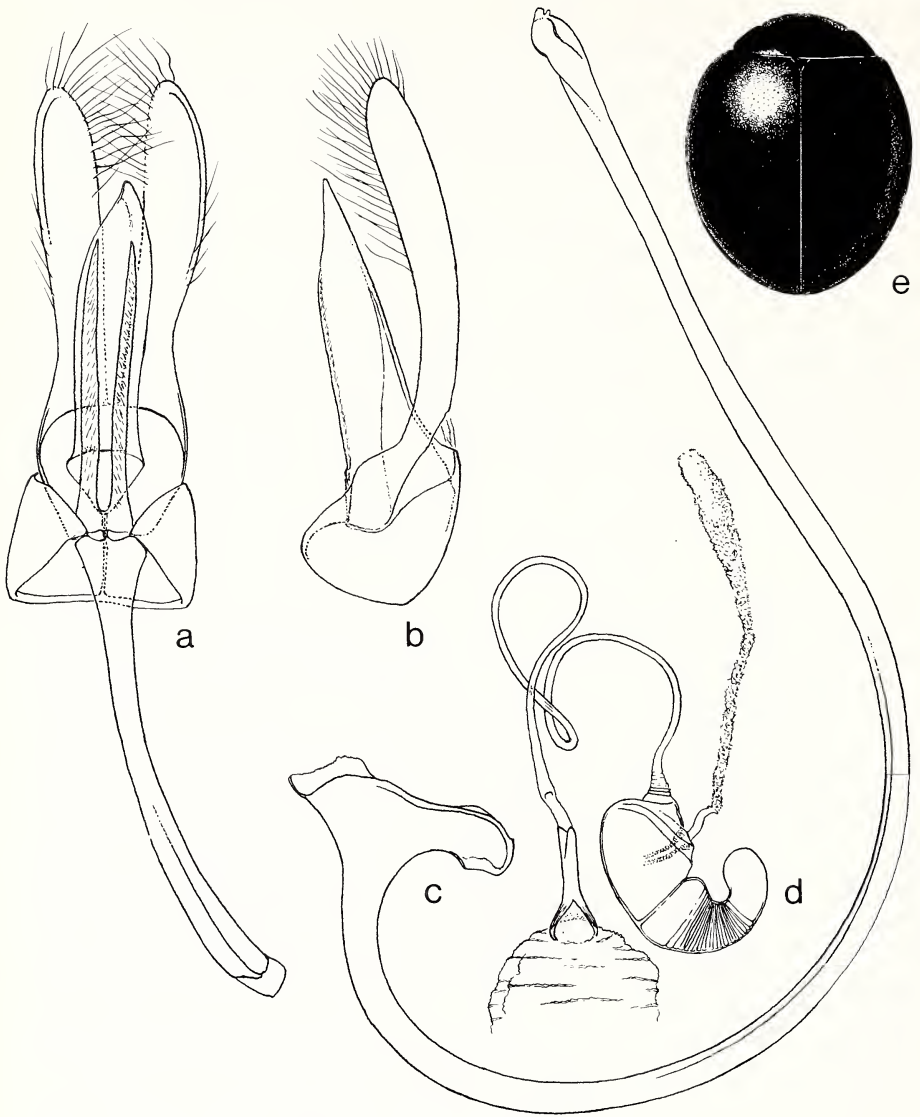


Fig. 518. *Exochomus aethiops*.

Diagnosis. Length 2.80 to 3.30 mm, width 2.0 to 2.70 mm. Form oval, somewhat elongate, not strongly convex (Fig. 520e). Color as described for *aethiops*. Dorsal surface somewhat dull, punctures fine, barely visible; epipleuron feebly descending, obliquely inclined. Male genitalia as in Figure 520a–c. Female genitalia as in Figure 520d.

Discussion. In addition to the comments under *E. aethiops*, *E. townsendi* differs from that species in having the epipleuron less strongly descending, lateral margin

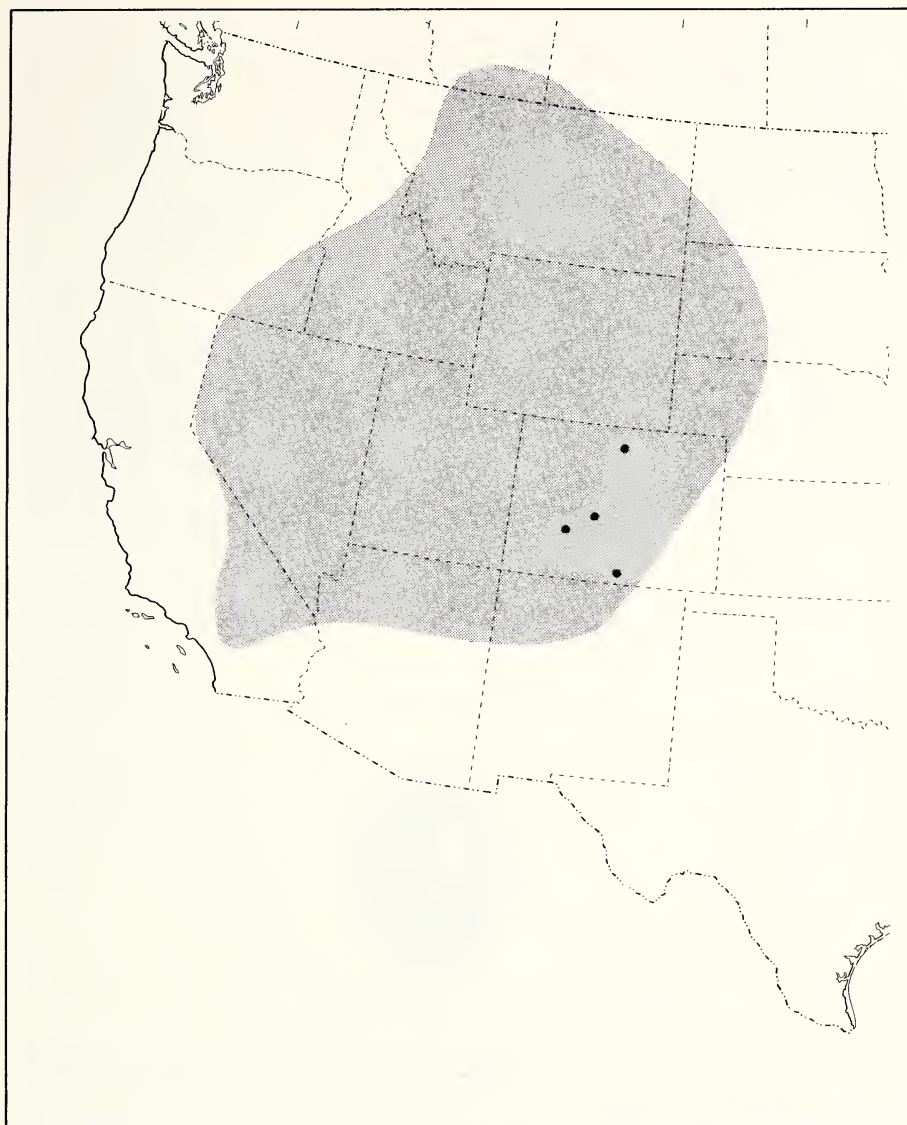


Fig. 519. Distribution. *Exochomus aethiops* (shaded); *E. townsendi* (dot).

of elytron less strongly explanate, and the sides of the pronotum and elytra appear continuous in dorsal view, discontinuous in *E. aethiops*.

Type locality. Colonia Garcia, Chihuahua, Mexico (lectotype designated by Gordon, 1974a).

Type depository. USNM (35557).

Distribution. Figure 519. COLORADO: Buena Vista; Estes Park; Garland; Gunnison.

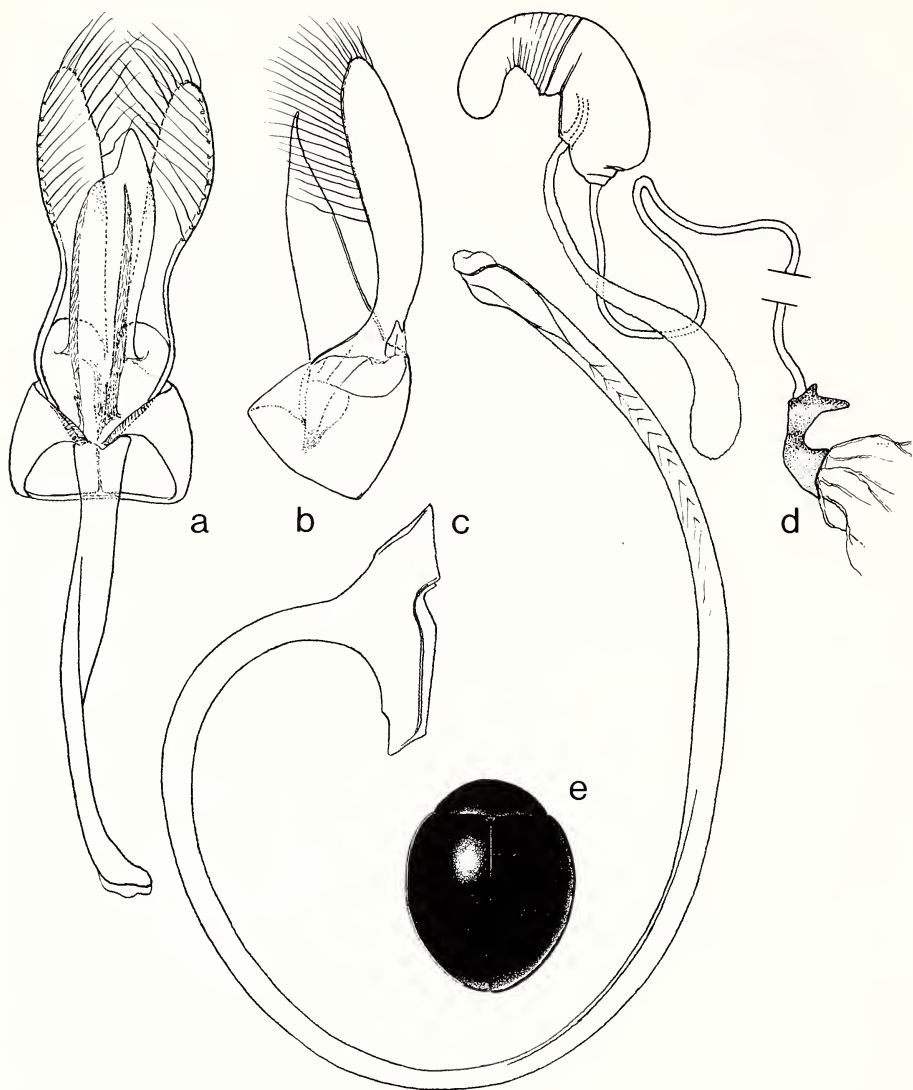


Fig. 520. *Exochomus townsendi*.

Exochomus californicus Casey
Fig. 521a-c, 522a-c; Map, Fig. 524

Exochomus californicus Casey, 1899, p. 107.—Casey, 1908, p. 410.—Leng, 1908, p. 40.—Hatch, 1961, p. 163.—Chapin, 1965a, p. 249.
Exochomus marginipennis var. *californicus*: Weise, 1904, p. 359.—Leng, 1920, p. 217.—Korschefsky, 1932, p. 263.

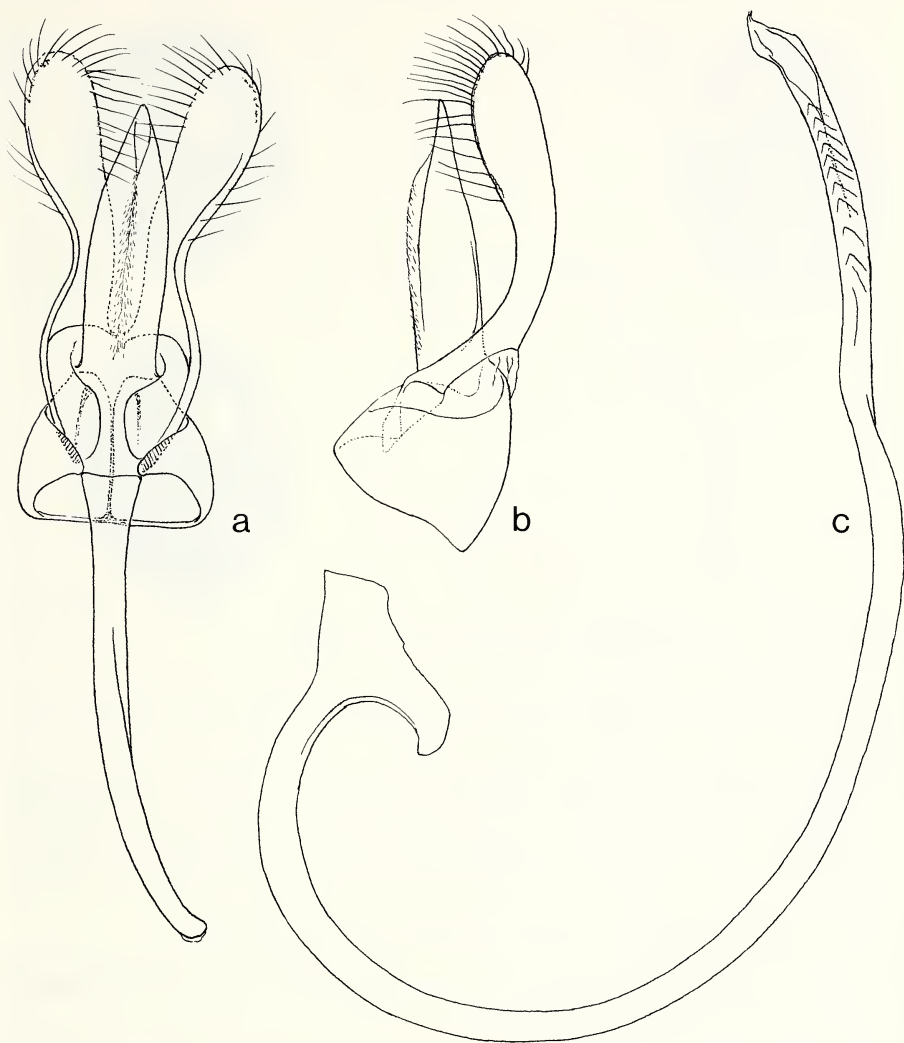


Fig. 521. *Exochomus californicus* (male genitalia).

Diagnosis. Length 3.50 to 4.0 mm, width 2.90 to 3.20 mm. Form oval, not strongly convex. Head and pronotum black; elytron black or brown with yellow or orange rectangular humeral area and subapical spot (Fig. 522b, c), humeral spot sometimes extended to apical $\frac{1}{3}$ of elytron. Dorsal surface smooth, polished, punctures barely visible; epipleuron feebly descending externally, obliquely inclined. Male genitalia as in Figure 521a–c. Female genitalia as in Figure 522a.

Discussion. The color pattern of this species is quite popular among members of the Chilocorini. Both *Brumoides histrio* and *B. hogei* exhibit the same pattern and

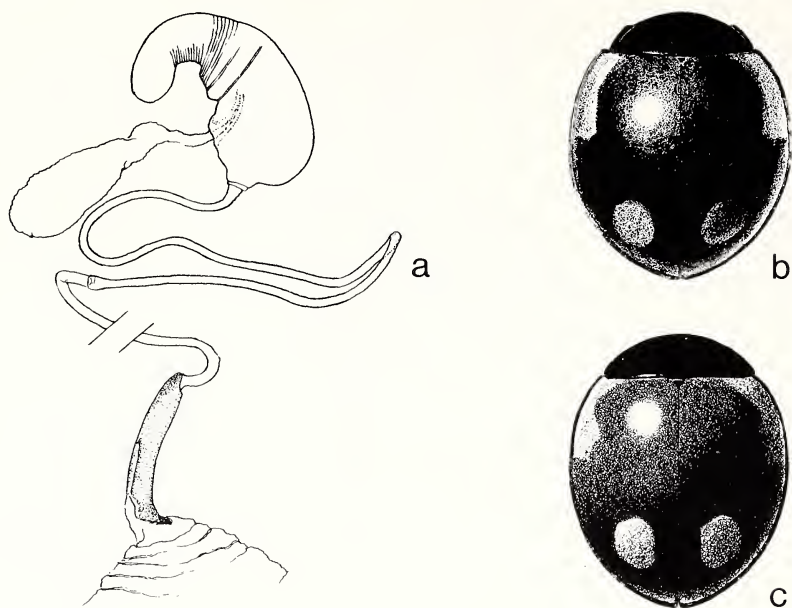


Fig. 522. *Exochomus californicus* (female genitalia, habitus).

care must be taken to examine the generic characters to insure correct generic placement.

There are 5 type specimens of *E. californicus* in the Casey collection. The localities, all in California, represented are: "Cal" (Hoopa Valley, Trinity River, Humboldt Co.); Siskiyou Co.; Alameda Co. I here designate and so label a male from Alameda Co. as the lectotype. The other 4 specimens are designated and labeled as paralectotypes.

Type locality. Alameda Co., California (lectotype here designated).

Type depository. USNM (35558).

Distribution. Figure 524. Washington to Nevada and northern California (Montana specimen possibly mislabeled).

Exochomus quadripustulatus (L.)

Fig. 523a-e; Map, Fig. 524

Coccinella 4-pustulata L., 1758, p. 367.

Exochomus 4-pustulatus: Redtenbacher, 1843, p. 11.—Weise, 1879, p. 132.

Exochomus quadripustulatus: Mulsant, 1846, p. 172.—Mulsant, 1850, p. 485.—Crotch, 1874b, p. 192.—Chapin, 1965a, p. 249.—Clausen et al., 1978, pp. 50, 51, 101 (for complete synonymy see Korschefsky, 1932).

Exochomus quatuoropustulatus: Korschefsky, 1932, p. 256.

Diagnosis. Length 3.60 to 4.80 mm, width 2.85 to 4.0 mm. Form oval, lateral margin of elytron strongly beaded and somewhat explanate. Head and pronotum

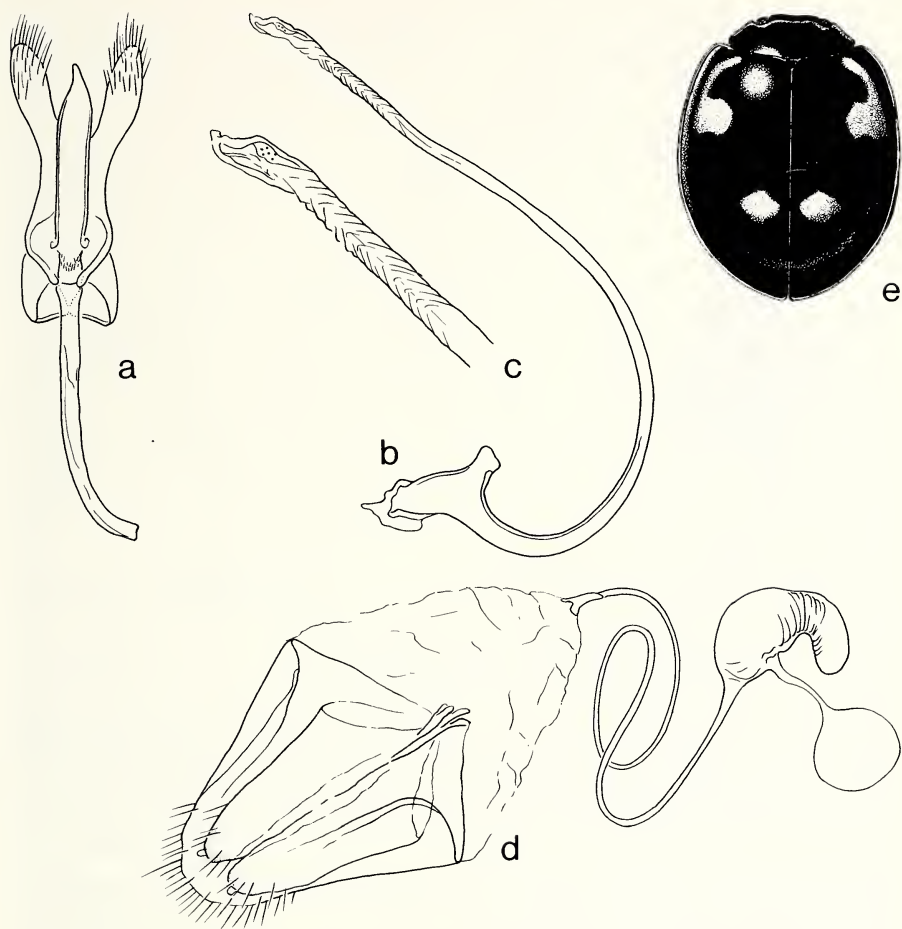


Fig. 523. *Exochomus quadripustulatus*.

black except anterior margin and angle of pronotum narrowly yellow; elytron with comma-shaped yellow or orange humeral spot (spot sometimes rectangular) and spot on suture just behind middle (Fig. 523e); ventral surface black except inner $\frac{1}{2}$ of epipleuron in basal $\frac{1}{2}$ and broad border around abdomen reddish yellow. Dorsal surface smooth, punctures fine, distinct; epipleuron moderately descending, obliquely inclined. Male genitalia as in Figure 523a-c. Female genitalia as in Figure 523d.

Discussion. The similarities in color pattern and shape between this introduced palearctic species and the native *E. californicus* are striking. The distributions barely overlap however, and the key characters are sufficient for recognition. I have seen specimens of *E. quadripustulatus* from only a few localities, but K. Hagen (pers. comm.) informs me that the known distribution is from the San Francisco Bay area south to Monterey.

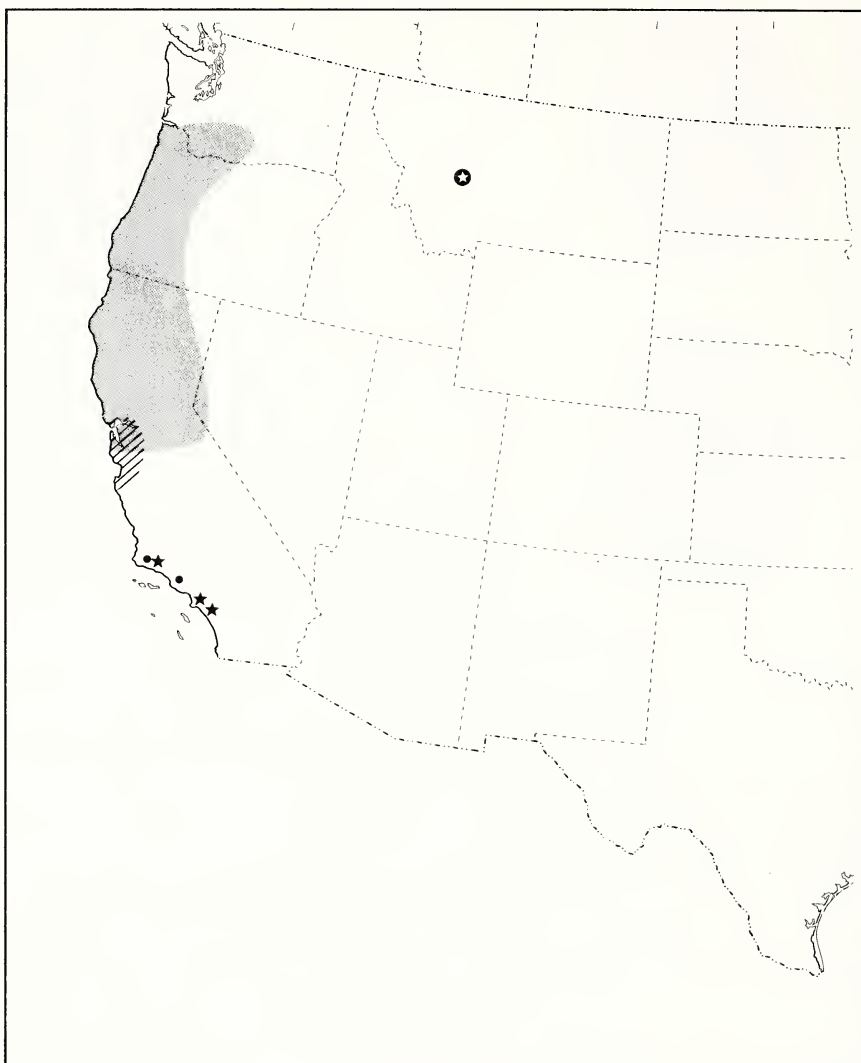


Fig. 524. Distribution. *Exochomus californicus* (shaded, disjunct locality circled star); *E. quadripustulatus* (cross hatch); *E. metallicus* (dot); *Halmus chalybeus* (star).

Type locality. "Europa".

Type depository. Type not examined.

Distribution. Figure 524. CALIFORNIA: San Francisco Bay area south to Monterey (coastal). Specimens examined: Hayward; San Mateo Co., Stanford; Santa Clara Co., Alum Rock Park, Stevens Creek Area, San Jose.

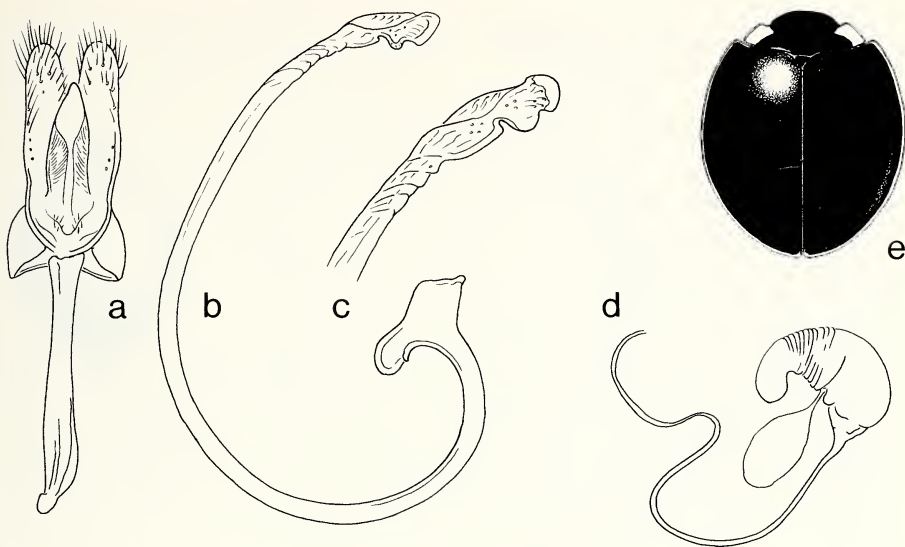


Fig. 525. *Exochomus flavipes*.

Exochomus flavipes (Thunberg)

Fig. 525a-e

Coccinella flavipes Thunberg, 1781, p. 21.

Exochomus flavipes: Crotch, 1874b, p. 192.—Sicard, 1909, p. 99.—Reitter, 1911, p. 135.—Korschefsky, 1932, p. 254.—Chapin, 1965a, p. 249.—Bartlett, et al., 1978, pp. 69, 81, 157, 167, 371.—Tassan et al., 1982, p. 16 (for complete synonymy see Korschefsky, 1932).

Diagnosis. Length 3.0 to 4.0 mm, width 2.50 to 3.70 mm. Form oval, convex. Color black (Fig. 525e) except lateral $\frac{1}{3}$ of pronotum, propleuron, leg, and most of abdomen yellow. Dorsal surface smooth, punctation fine, distinct; epipleuron descending externally, nearly vertical. Male genitalia as in Figure 525a-c. Female genitalia as in Figure 525d.

Discussion. The entirely black dorsal surface with broadly yellow lateral margins on the pronotum are distinctive. This is another introduced species naturally occurring in Africa and the Palearctic Region which is known to be established only in the San Francisco Bay area (K. Hagen, pers. comm.).

Type locality. Cape of Good Hope, South Africa.

Type depository. Type not examined.

Distribution. CALIFORNIA: San Francisco Bay area.

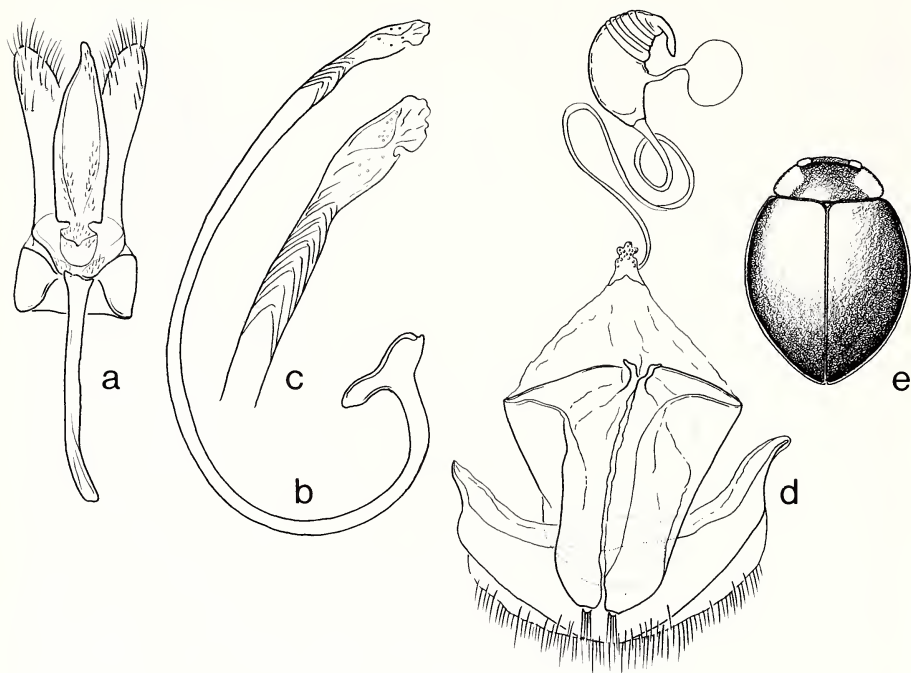


Fig. 526. *Exochomus metallicus*.

Exochomus metallicus Korschefsky

Fig. 526a-e; Map, Fig. 524

Exochomus metallicus Korschefsky, 1935, p. 60.—Clausen et al., 1978, p. 151.

Diagnosis. Length 3.0 to 4.50 mm, width 2.10 to 3.50 mm. Form oval, somewhat elongate, not strongly convex. Dorsal surface metallic green except lateral $\frac{1}{3}$ to $\frac{5}{6}$ of pronotum yellow (Fig. 526e); ventral surface black except mouthparts, prosternum, leg and abdomen yellow. Dorsal surface pubescent, coarsely, densely punctured; epipleuron not strongly descending, obliquely inclined. Male genitalia as in Figure 526a-c. Female genitalia as in Figure 526d.

Discussion. This striking species resembles only one other imported species in the North American fauna, *Halmus chalybeus*, which is not pubescent. *Exochomus metallicus* is known to be established in the Santa Barbara, California, area (K. Hagen, pers. comm.) and I have seen specimens from Santa Barbara and Oxnard.

Type locality. Abyssinia, between Addis Alam and Jem Jem, 7,000–8,000 ft.

Type depository. BMNH.

Distribution. Figure 524. CALIFORNIA: Oxnard; Santa Barbara.

Genus *Halmus* Mulsant

Orcus (*Halmus*) Mulsant, 1850, p. 471.—Crotch, 1874b, p. 188.—Korschefsky, 1932, p. 249.

Orcus: Leng, 1920, p. 217.

Halmus: Weise, 1923, p. 134.—Chapin, 1965a, p. 257. Type-species; *Coccinella chalybea* Boisduval, by monotypy.

Chilocorini with form nearly circular, convex, upper surface glabrous. Antenna 7-segmented, first segment bent, apically produced in conical lobe (Fig. 527a). Apical segment of maxillary palpus oval, apical margin oblique. Prosternal lobe broad, truncate apically. Elytron with reflexed lateral margin; epipleuron not foveolate for reception of femoral apices. Abdomen with 6 visible sterna in both sexes. Postcoxal line incomplete, of *Nephus* type (Fig. 527b). Leg slender, femur not inflated; tibial spur absent; tarsal claw with large basal tooth (Fig. 527c). Male genitalia symmetrical. Female genitalia with long sperm duct; small infundibulum present (Fig. 527g).

One species, *Halmus chalybeus* (Boisduval), has been introduced into California from Australia and is established (K. Hagen, pers. comm.). This species is unique among North American Chilocorini because the dorsum is a brilliant blue or green and lacks pubescence. Members of this genus are scale predators with specific host records as follows. *Anoidiella aurantii* (Maskell), *Quadraspidiotus perniciosus* (Comstock), *Pseudococcus calceolariae* (Maskell), *Saissetia oleae* (Olivier).

Halmus chalybeus (Boisduval)

Fig. 527a–h; Map, Fig. 524

Coccinella chalybea Boisduval, 1835, p. 595.

Orcus (Halmus) chalybeus: Mulsant, 1850, p. 471.—Crotch, 1874b, p. 188.

Orcus chalybeus: Timberlake, 1920a, p. 145.

Halmus chalybeus: Weise, 1923, p. 134.—Chapin, 1965a, p. 257.

Diagnosis. Length 3.0 to 4.25 mm, width 2.85 to 3.90 mm. Form rounded, convex. Color entirely green or blue except male head and lateral margin of pronotum yellow (Fig. 527h); mouthparts, mesepimeron, and abdomen yellow. Male genitalia as in Figure 527d–e. Female genitalia as in Figure 527g.

Type locality. “Nouvelle Hollande”.

Type depository. DLM.

Distribution. Figure 524. CALIFORNIA: Costa Mesa; Los Angeles; Santa Barbara.

Genus *Chilocorus* Leach

Chilocorus Leach, 1815b, in Brewster, p. 116.—Redtenbacher, 1843, p. 11.—Mulsant, 1850, p. 452.—Crotch, 1873, p. 376.—Crotch, 1874b, p. 183.—Gorham, 1892, p. 175.—Korschefsky, 1932, p. 237.—Wingo, 1952, p. 25.—Belicek, 1976, p. 318.—Chapin, 1965a, p. 263.—J. Chapin, 1974, p. 50. Type-species; *Coccinella cacti* L., by monotypy.

Chilocorini with form broadly oval, convex, dorsal surface glabrous. Antenna 8-segmented, club 4-segmented, fusiform (Fig. 528a). Apical segment of maxillary palpus with lateral margins nearly parallel, apical margin strongly oblique. Prosternal lobe flat, wide. Elytral margin not reflexed, finely beaded; epipleuron descending externally, shallowly foveolate for reception of femoral apices. Abdomen with 6 visible sterna in male, 5 in female. Postcoxal line incomplete (Fig. 528b), merging

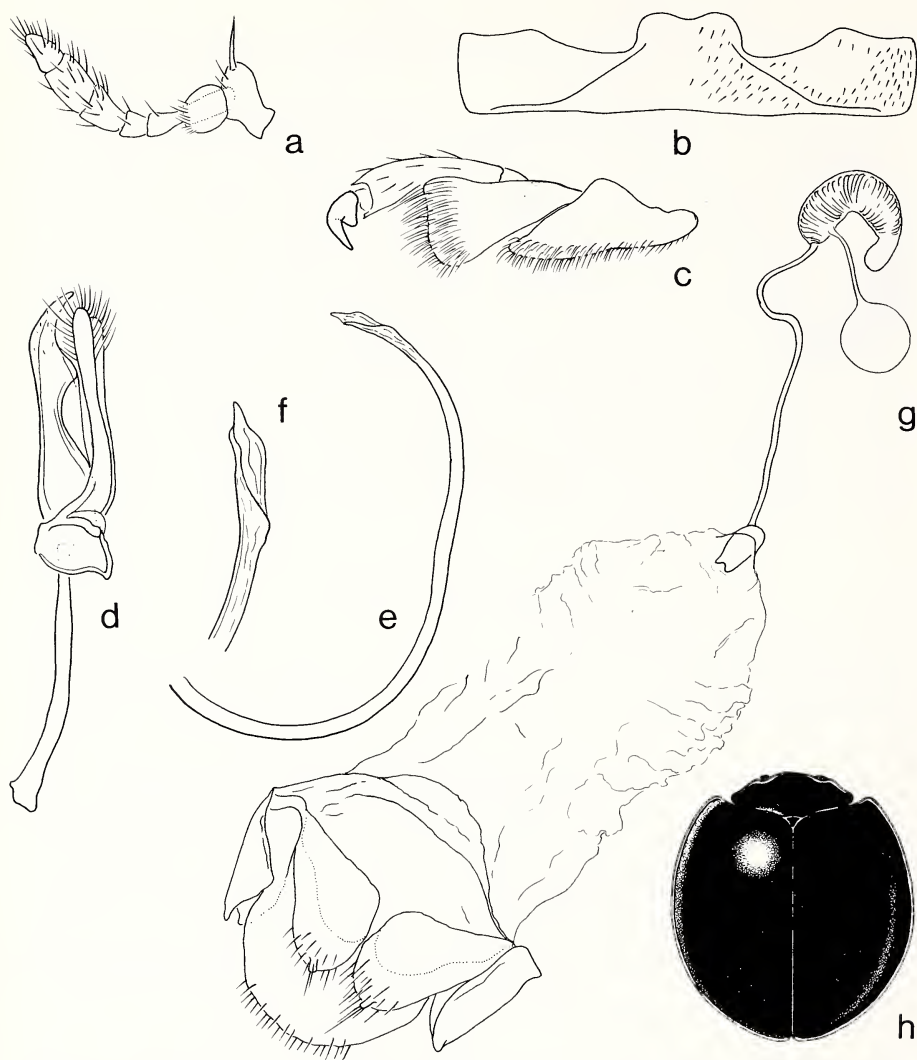


Fig. 527. *Halmus chalybeus*. a. Antenna. b. Postcoxal lines. c. Tarsus. d-f. Male genitalia. g. Female genitalia. h. Habitus.

with posterior margin of abdominal sternum. Leg with stout femora; tibia with external, triangular tooth at basal third; tarsal claw with small, quadrate tooth at base. Male genitalia with basal lobe slightly asymmetrical; trapes slender, longer than phallobase; siphon stout, twisted near apex. Female genitalia with spermathecal capsule large, without differentiation into nodulus and ramus, cornu short, bent, with falciform appendix at apex; infundibulum absent.

This is a large genus with approximately 70 species distributed worldwide. Nine of these, including 2 species (*C. kuwanae* Silvestri and *C. bipustulatus* L.) imported

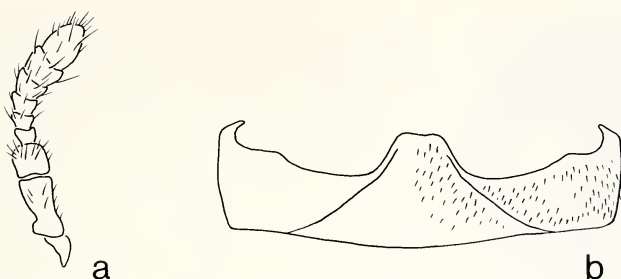


Fig. 528. *Chilocorus* sp. a. Antenna. b. Postcoxal lines.

for biocontrol purposes, occur north of Mexico. Identification of the imported species does not present a problem because both are distinctive; however, the native species are a different matter. They are amazingly similar in appearance, and some are apparently recognizable only through karyological studies. Smith (1959) recognized 2 such species and it is quite likely that still others occur in populations as yet untested. Drea (1956) did a biological analysis of the California species of *Chilocorini*, and was able to differentiate the species of *Chilocorus* that occur there. I use the conclusions of Drea and Smith in this taxonomic treatment because I have not been able to find any additional morphological criteria to aid in distinguishing the species. As a result, it is only possible to approximate the distribution of the various species, the degree of sympatry or allopatry cannot be determined except in a rather hazy fashion. There are a number of specific host records available for members of *Chilocorus*; most are scale insects, but some species at least accept aphids as prey although aphids may not be the preferred food. These host records are listed below. Adelgid; *Adelges picea* (Ratzeburg). Aphids; *Acyrtosiphon solani* (Kaltenbach), *Anoecia corni* (F.), *Aphis cytisorum* Hartig, *Aphis donacis* Passerini, *Chromaphis juglandicola* (Kaltenbach), *Eriosoma lanigerum* (Hausmann), *Macrosiphum avenae* (F.), *Monellia californica* Essig, *Monellia caryae* (Monell), *Monellia caryella* (Fitch), *Myzus malisuctus* Matsumura, *Phorodon humuli* (Schränk), *Rhopalomyzus lonicerae* (Siebold), *Rhopalosiphum padi* (L.), *Schizaphis graminum* (Rondani), *Schizaphis piricola* (Matsumura), *Toxoptera citricidus* (Kirkaldy). Scales; *Africaspis chionaspiformis* (Newstead), *Antonina bambusae* (Maskell), *Aonidia lauri* (Bouche), *Aonidiella aurantii* (Maskell), *Aonidiella citrina* (Coquillett), *Aonidiella taxus* Leonardi, *Aonidomytilus albus* (Cockerell), *Aspidiotus nerii* Bouche, *Asterolecanium coffeae* Newstead, *Asterolecanium phoenicis* Rao, *Asterolecanium pustulans* (Cockerell), *Aulacaspis difficilis* (Cockerell), *Aulacaspis rosae* (Bouche), *Aulacaspis tubercularis* (Newstead), *Ceroplastes destructor* Newstead, *Ceroplastes floridensis* Comstock, *Ceroplastes japonicus* Green, *Ceroplastes rubens* Maskell, *Ceroplastes rusci* (L.), *Ceroplastes sinensis* Del Guercio, *Ceroplastes zonatus* Newstead, *Chionaspis salicis* (L.), *Chrysomphalus aonidum* (L.), *Chrysomphalus dictyospermi* (Morgan), *Coccus africanus* (Newstead), *Coccus colemani* Kannan, *Coccus hesperidum* L., *Coccus longulus* (Douglas), *Coccus viridis* (Green), *Cryptes baccatus* (Maskell), *Cryptococcus fagisuga* Lindinger, *Drosicha corpulenta* (Kuwana), *Dysmicoccus brevipes* (Cockerell), *Duplachionaspis saccharifolii* (Zehntner), *Ehrhornia cupressi* (Ehrhorn), *Ericerus pela* Chavannes, *Eriococcus casuarinae* (Maskell), *Eriococcus coriaceus* Maskell, *Eriococcus ironsidei* Williams, *Er-*

iococcus leptospermi Maskell, *Eulecanium kunoensis* Kuwana, *Eulecanium tiliae* (L.), *Filippia oleae* Costa, *Fiorinia theae* (Green), *Gossyparia casuarinae* Maskell, *Gossyparia spuria* (Modeer), *Hemiberlesia lataniae* (Signoret), *Hemiberlesia rapax* (Comstock), *Icerya purchasi* Maskell, *Inchoaspis dentilobis* (Newstead), *Inglisia conchiformis* Newstead, *Ischnaspis longirostris* (Signoret), *Kermes ilicis* (L.), *Kermes miyasakii* Kuwana, *Kermes nakagawae* Kuwana, *Lepidosaphes afganensis* Borchsenius, *Lepidosaphes beckii* (Newman), *Lepidosaphes conchiformis* (Gmelin), *Lepidosaphes gloverii* (Packard), *Lepidosaphes olivina* Leonardi, *Lepidosaphes ulmi* (L.), *Leucaspis* sp., *Lineaspis striata* (Newstead), *Mesolecanium nigrofasciatum* (Pregande), *Miscanthaspis tegalensis* (Zehntner), *Monophlebulus* sp., *Nelaspis humilis* (Brain), *Nipaeococcus aurilanus* (Maskell), *Nipaeococcus filamentosus* (Cockerell), *Nipaeococcus nipae* (Maskell), *Paralecanium frenchii* (Maskell), *Parlatoria blanchardi* (Targioni-Tozzetti), *Parlatoria oleae* (Colvee), *Parlatoria pergandii* Comstock, *Parlatoria proteus* (Curtis), *Parlatoria ziziphi* Lucas, *Parthenolecanium corni* Bouche, *Parthenolecanium persicae* (F.), *Parthenolecanium quercifex* (Fitch), *Phenacaspis grandilobis* (Maskell), *Phenacoccus solani* Ferris, *Pinnaspis strachani* (Cooley), *Planococcus citri* (Risso), *Planococcus kenya* (LePelley), *Planococcus lilacinus* (Cockerell), *Pollinia pollini* (Costa), *Protopulvinaria mangiferae* (Green), *Pseudococcus longispinus* (Targioni-Tozzetti), *Pseudaonidia duplex* (Cockerell), *Pseudaonidia paeoniae* (Cockerell), *Pseudoparlatoria ostreata* (Cockerell), *Pulvinaria aurantii* (Cockerell), *Pulvinaria maxima* Green, *Pulvinaria okitsuensis* Kuwana, *Pulvinaria psidii* Maskell, *Quadraspidiotus ostreaeformis* (Curtis), *Saissetia coffeae* (Walker), *Saissetia oleae* (Olivier), *Unaspis yanonensis* (Kuwana).

KEY TO SPECIES OF *Chilocorus*

1. Elytron brown or reddish brown with 3 small discal spots in transverse row, usually partially fused (Fig. 537d) *bipustulatus* (L.)
- Elytron black or brown with one yellow or red spot (Fig. 536d) 2
- 2(1). Spot on elytron median or slightly behind middle (Fig. 536d); form orbicular *kuwanae* Silvestri
- Spot on elytron anterior to middle (Fig. 531d); form elongate or orbicular 3
- 3(2). Venter mostly yellow or red, only prosternum black 4
- Venter mostly black, only abdomen red or yellow 5
- 4(3). Form orbicular, strongly convex; spot on elytron small (Fig. 531d); mid Atlantic states *tumidus* Leng
- Form somewhat elongate, not strongly convex; spot on elytron large (Fig. 529e); extreme southern United States *cacti* (L.)
- 5(3). Species known only from California 6
- Species not occurring in California 7
- 6(5). Paramere with setae long, approximately 103 to 159 setae per paramere, setae in inner margin extending into basal $\frac{1}{2}$ (Fig. 532a) *orbis* Casey
- Paramere with setae short, approximately 47 to 88 setae per paramere, setae on inner margin confined to apical $\frac{1}{2}$ *fraternus* LeConte
- 7(5). Species occurring from the Atlantic coast to the Rocky Mts. in Alberta, and the Sierra Nevada in the United States; karyotype $2n = 22+s$ *stigma* (Say)
- Species occurring from southern Alberta and Saskatchewan to British Columbia 8
- 8(7). Karyotype $2n = 14$ *hexacyclus* Smith
- Karyotype $2n = 20$ *tricyclus* Smith

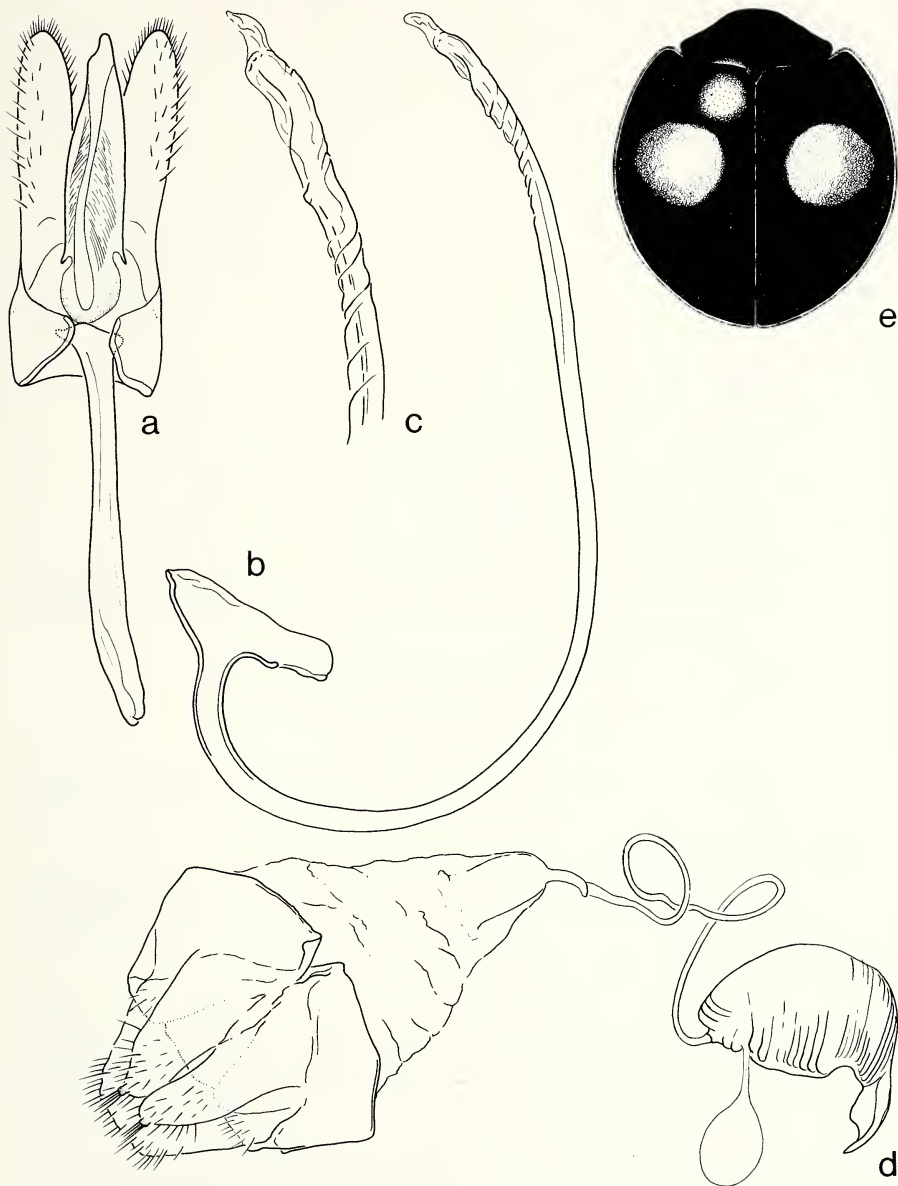


Fig. 529. *Chilocorus cacti*.

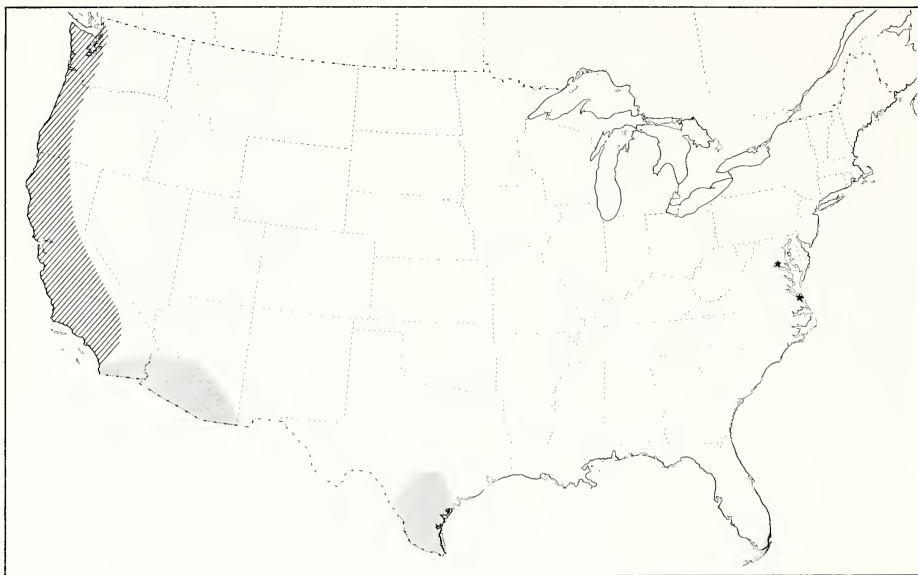


Fig. 530. Distribution. *Chilocorus cacti* (shaded, southern); *C. tumidus* (star); *C. orbis* (shaded, west coast).

Chilocorus cacti (L.)

Fig. 529a-e; Map, Fig. 530

Coccinella cacti L., 1767, p. 584.—Say, 1835, p. 202.

Chilocorus cacti: Mulsant, 1850, p. 459.—Crotch, 1873, p. 376.—Crotch, 1874b, p. 184.—Gorham, 1892, p. 175.—Leng, 1908, p. 38.—Casey, 1908, p. 408.—Korschefsky, 1932, p. 245.

Chilocorus confusor Casey, 1899, p. 105.—Casey, 1908, p. 408.

Chilocorus cacti var. *confusor*: Leng, 1908, p. 38.—Leng, 1920, p. 217.—Korschefsky, 1932, p. 246.

Chilocorus cacti confusor: Drea, 1956, p. 76.

Diagnosis. Length 4.0 to 6.20 mm, width 3.60 to 5.20 mm. Form oval, convex. Color black except large transverse spot on elytron (Fig. 529e) and mesosternum, metasternum, and abdomen yellow or red. Dorsal surface smooth, polished, punctures fine, distinct. Male genitalia as in Figure 529a-c. Female genitalia as in Figure 529d.

Discussion. The red or yellow ventral surface (except prosternum) will separate *C. cacti* from *C. fraternus* and allies which have the mesosternum and metasternum black. This species occurs primarily in northern South America, Central America, Mexico, and the Caribbean islands, with the northern range limit in the southern United States. There are 2 type specimens of *C. confusor* in the Casey collection, I here designate and label a male as the lectotype, and the other specimen as a paralectotype.

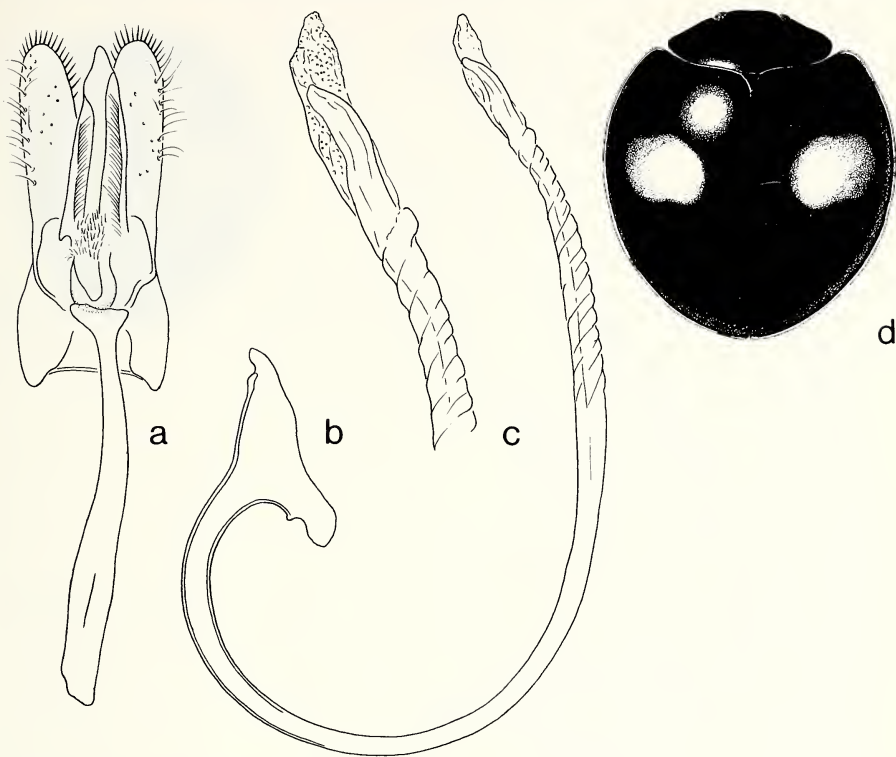


Fig. 531. *Chilocorus tumidus*.

Type locality. Of *cacti*, "America", of *confusor*, San Diego, California (lectotype here designated).

Type depository. Of *cacti*, type not examined; of *confusor*, USNM (35552).

Distribution. Figure 530. Southern Arizona, California, Florida, and Texas.

Chilocorus tumidus Leng
Fig. 531a-d; Map, Fig. 530

Chilocorus tumidus Leng, 1908, p. 37.—Korschefsky, 1932, p. 247.

Diagnosis. Length 4.20 to 5.75 mm, width 3.75 to 5.0 mm. Form orbicular, extremely convex, not tapered posteriorly. Color dark brown to black except elytron with transverse spot (Fig. 531d) and mesosternum, metasternum, and abdomen yellow or red. Dorsal surface smooth, polished, punctures fine, distinct. Male genitalia as in Figure 531a-c.

Discussion. This species resembles *C. cacti* which does not occur in the same geographic region. In *C. tumidus*, the elytral spots are much smaller and the form is distinctly rounded and strongly convex, while *C. cacti* is slightly elongate and not as

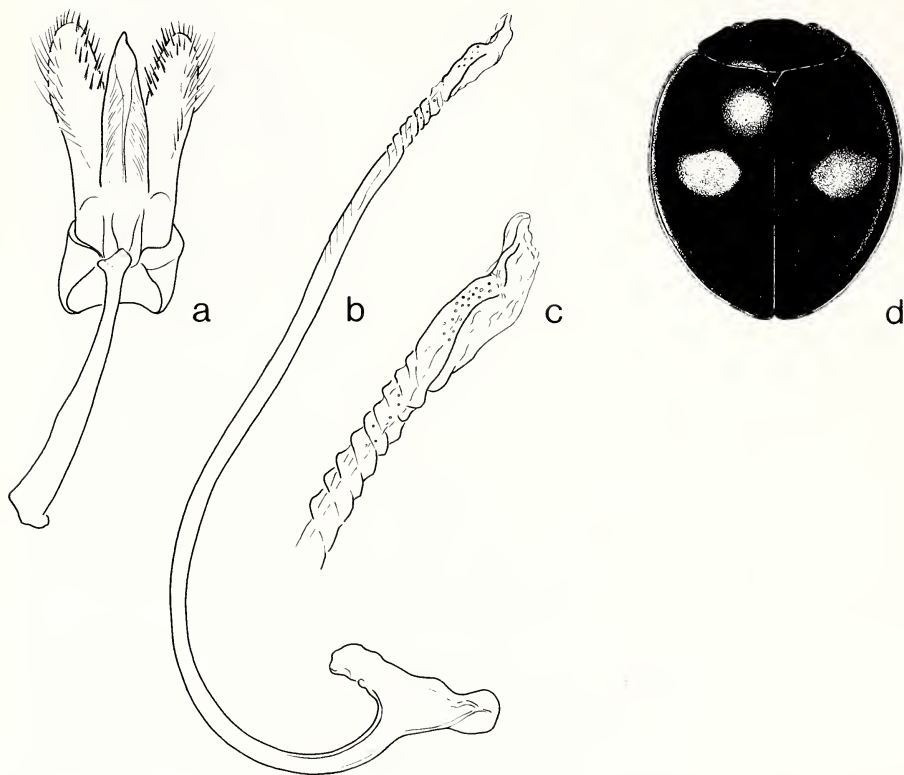


Fig. 532. *Chilocorus orbis*.

strongly convex. There are 2 female type specimens of *C. tumidus* in the USNM collection, one of which I designate and label the lectotype and the other as a paralectotype.

Type locality. Fortress Monroe, Virginia (lectotype here designated).

Type depository. USNM (40901).

Distribution. Figure 530. MARYLAND: 2 mi. N. of Priest Bridge. VIRGINIA: type locality.

Chilocorus orbis Casey
Fig. 532a-d; Map, Fig. 530

Chilocorus orbis Casey, 1899, p. 105.—Casey, 1908, p. 408.—Drea, 1956, p. 58.—Smith, 1959, p. 445.—Hatch, 1961, p. 163.

Chilocorus bivulnerus var. *orbis*: Leng, 1908, p. 37.—Korschefsky, 1932, p. 247.

Chilocorus stigma (Say): Korschefsky, 1932, p. 246 (in part).

Diagnosis. Length 4.0 to 5.10 mm, width 3.30 to 4.50 mm. Form oval, slightly tapered posteriorly, convex. Color black except spot on elytron (Fig. 532d) and abdomen yellow or red. Dorsal surface smooth, polished, punctures fine, distinct. Male genitalia as in Figure 532a-c.

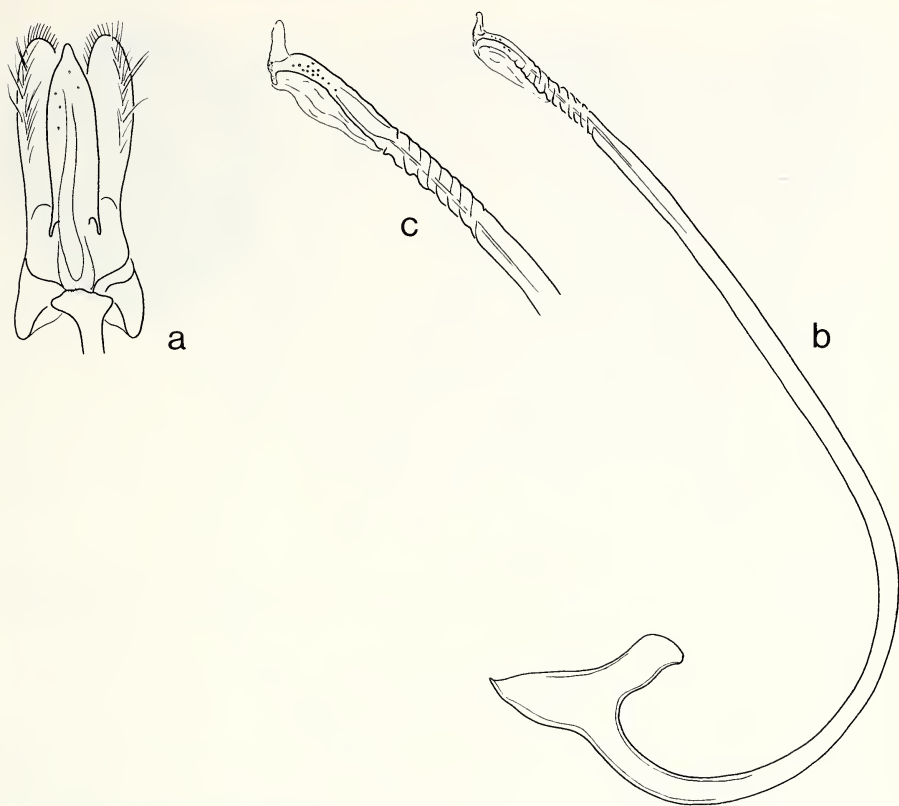


Fig. 533. *Chilocorus fraternus*.

Discussion. Male genitalia must be examined to separate *C. orbus* and *C. fraternus* (see key to species). The California species of *Chilocorus*, except for *cacti*, have been identified as *C. stigma* Say or *C. bivulnerus* Mulsant since Leng's publication in 1908. Drea (1956) and Smith (1959) have demonstrated that both *C. orbus* and *C. fraternus* are valid species and that *C. stigma* does not occur in California. There are 3 type specimens of *C. orbus* in the Casey collection; I here designate and label a male the lectotype, the other 2 specimens as paralectotypes.

Type locality. California (lectotype here designated).

Type depository. USNM (35553).

Distribution. Figure 530. Western Washington and Oregon to southern California.

Chilocorus fraternus LeConte

Fig. 533a-c

Chilocorus fraternus LeConte, 1860, (1857), p. 70.—Casey, 1899, p. 105.—Casey, 1908, p. 408.—Drea, 1956, p. 70.—Smith, 1959, p. 445.—Hatch, 1961, p. 162.—Smith, 1965, p. 1614.

Chilocorus bivulnerus var. *fraternus*: Crotch, 1873, p. 376.—Leng, 1920, p. 217.

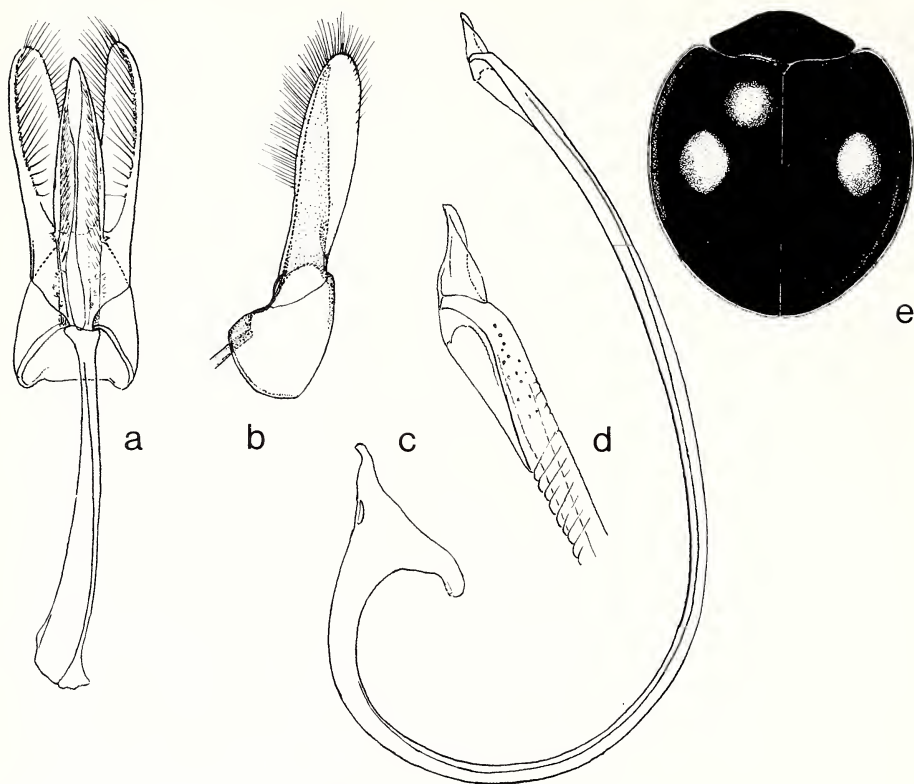


Fig. 534. *Chilocorus stigma*.

Chilocorus bivulnerus Mulsant: Leng, 1908, p. 37 (in part).

Chilocorus stigma (Say): Korschevsky, 1932, p. 246 (in part).

Diagnosis. Length 3.40 to 5.10 mm, width 3.0 to 4.30 mm. Description as for *C. orbus*. Male genitalia as in Figure 533a-c.

Discussion. The number and distribution of the setae on the parameres are diagnostic characters for this species (see key to species and comments under *orbus*). The actual distribution of *C. fraternus* is not known. Drea (1956) stated that "It appears that this species is found chiefly in the Central Valley of the state" (California). Hatch (1961) reported it as "common" in the Pacific Northwest. Since Hatch did not examine the male genitalia this may or may not be the case. Until the genitalia of all available specimens are examined, and until karyotype studies are carried out to determine the distribution of *C. tricyclus*, the actual distribution of any of these species cannot be accurately stated.

Type locality. Sacramento, California.

Type depository. MCZ.

Distribution. (see comments above) CALIFORNIA: Central Valley. PACIFIC NORTHWEST: ?

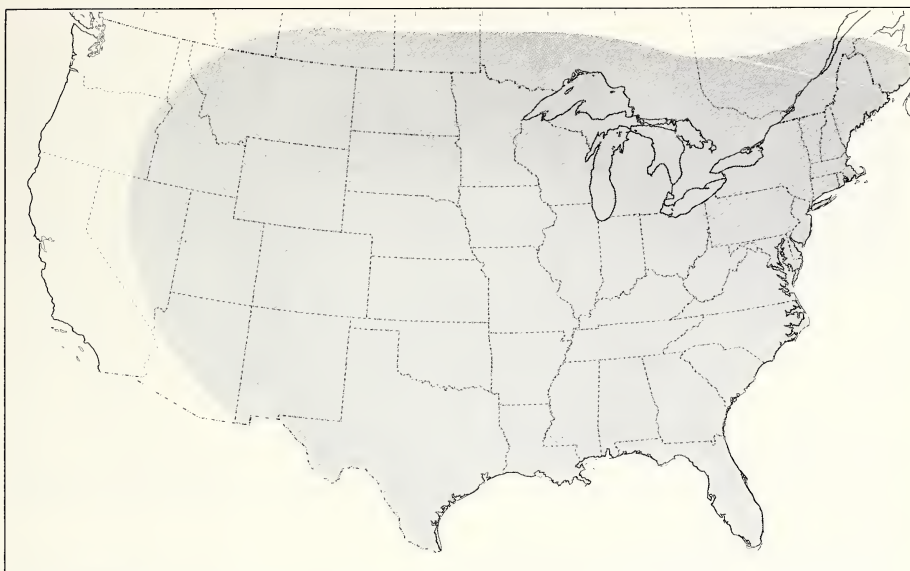


Fig. 535. Distribution. *Chilocorus stigma*.

Chilocorus stigma (Say)
Fig. 534a-e; Map, Fig. 535

Coccinella stigma Say, 1835, p. 202.

Chilocorus stigma: Melsheimer, 1853, p. 130.—Mulsant, 1856, p. 148.—Korschefsky, 1932, p. 246.—Smith, 1959, p. 445.—J. Chapin, 1974, p. 50.—Belicek, 1976, p. 319.

Chilocorus bivulnerus Mulsant, 1850, p. 460.—Mulsant, 1856, p. 148.—Crotch, 1873, p. 376.—Crotch, 1874b, p. 185.—Casey, 1899, p. 105.—Leng, 1908, p. 37.—Wingo, 1952, p. 47.

Diagnosis. Length 3.75 to 5.0 mm, width 3.0 to 4.25 mm. Form oval, tapered slightly posteriorly, convex. Color black except spot on elytron (Fig. 534e) and abdomen yellow or red. Dorsal surface smooth, punctures larger, denser than in *C. orbus*. Male genitalia as in Figure 534a-d. Karyotype: $2n = 22 + s$. Polymorphic: males, $2n = 19-25$; females, $2n = 20-26$.

Discussion. Two species, *cacti* and *tumidus*, occur in parts of the eastern range of *C. stigma*. Both of these species have yellow or red meso- and metasterna, in *C. stigma* these areas are black or at least brown. *Chilocorus stigma* apparently does not occur west of the Rocky Mountains in Alberta or the Sierra Nevada in the United States. In Alberta it is sympatric with *C. hexacyclus* from which *C. stigma* can be separated by karyotype.

Type locality. Not stated.

Type depository. DLM (not examined).

Distribution. Figure 535. Nova Scotia to Florida, west to Alberta and Arizona.

Chilocorus hexacyclus Smith

Chilocorus hexacyclus Smith, 1959, p. 446.—Belicek, 1976, p. 319.

Morphologically not separable from *C. stigma*. Karyotype: $2n = 14$. Meiotic formula—6 ring II + 1; neo-XY (male): XX (female) II.

Type locality. Conquest, Saskatchewan (subsequently established by Belicek, 1976).

Type depository. CNC.

Distribution. ALBERTA: "eastern foothills of the Rocky Mountains". SASKATCHEWAN: type locality.

Chilocorus tricyclus Smith

Chilocorus tricyclus Smith, 1959, p. 446.—Hatch, 1961, p. 163.—Belicek, 1976, p. 319.

Morphologically not separable from *stigma*. Karyotype: $2n = 20$. Meiotic formula—3 ring II + 6 non-ring II; II + 1 neo-XY (male): XX (female) II.

Type locality. Grand Forks, British Columbia (subsequently established by Belicek, 1976).

Type depository. CNC.

Distribution. BRITISH COLUMBIA: "interior of British Columbia". WASHINGTON: Seattle.

Chilocorus kuwanae Silvestri

Fig. 536a-d

Chilocorus kuwanae Silvestri, 1909, p. 126.—Korschefsky, 1932, p. 240.—Mader, 1955, p. 781.—Kamiya, 1959, p. 101.—Sasaji, 1971a, p. 226.

Chilocorus similis: Lewis, 1896, p. 31 (not *similis* Rossi, 1790) (misidentification).—Essig, 1931, p. 289.—Clausen, 1956, p. 2.—Smith, 1965, p. 1614.—Clausen et al., 1978, pp. 81, 121, 123, 125.

Chilocorus similis var. *japonicus* Sicard, 1907, p. 211.—Sasaji, 1971a, p. 226.

Chilocorus renipustulatus: Lewis, 1873, p. 56 (not *renipustulatus* Scriba, 1792).—Sasaji, 1971a, p. 226.

Diagnosis. Length 3.0 to 4.75 mm, width 2.90 to 4.50 mm. Form orbicular, lateral margin of elytron broadly explanate. Color black except spot on elytron at or behind middle (Fig. 536d) and abdomen yellow or red. Dorsal surface smooth, polished, punctures fine, distinct. Male genitalia as in Figure 536a-c.

Discussion. This species, imported from Japan, is very similar in appearance to the native species of *Chilocorus* (*fraternus*, *orbis*, etc.), but the spots on the elytra are located at the middle or slightly behind the middle of each elytron, and the lateral margin of the elytron is more strongly flared. The name applied to the species introduced into California as *C. similis* Rossi has been the subject of debate for some years. *Chilocorus kuwanae* is the name in current useage by Japanese scientists, and is the correct name. Type specimens of *C. similis* have been examined and compared with examples of *C. kuwanae*. The head of *C. similis* is somewhat shiny with distinctly separated punctures; the pronotum has the punctures coarse and quite close together;

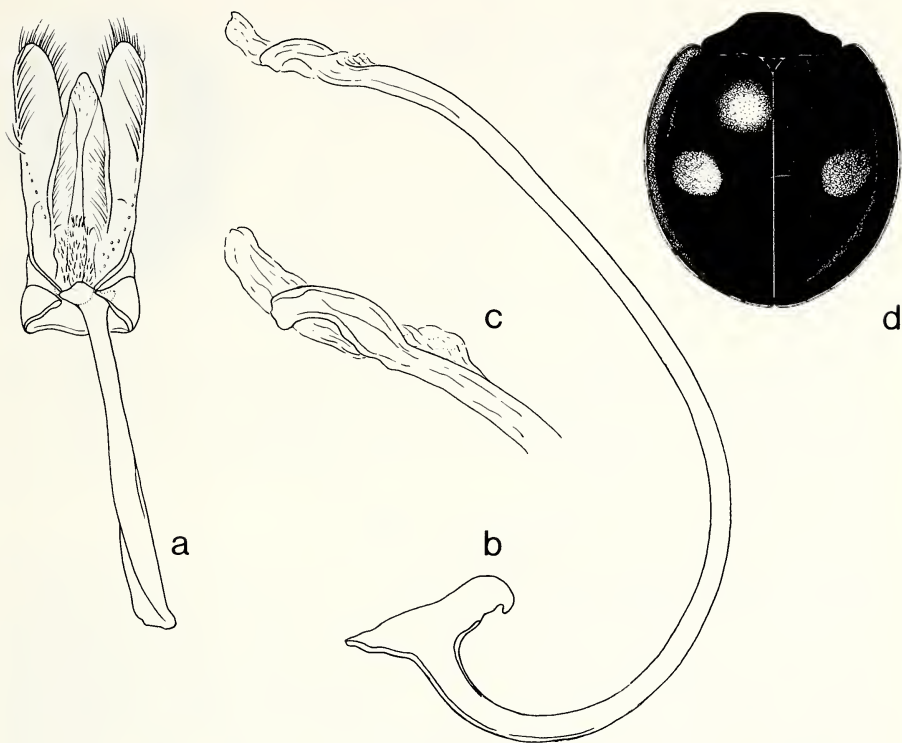


Fig. 536. *Chilocorus kuwanae*.

and the lateral margin of the elytron feebly explanate. The head of *C. kuwanae* is dull, strongly alutaceous with punctures extremely close together; the pronotum has the punctures fine and widely separated; and the lateral margin of the elytron widely explanate. The type series consists of 2 female specimens, one of which, labeled "28030/Typus(red paper)/Affinis R Etrur Rossi/Zool. Mus. Berlin" I designate and label as the lectotype. The other specimen, labeled "affinis Ross Etr/Etrur Rossi Hist. Coll. No. 28030", is designated as a paralectotype.

Type locality. "Cine e Giappone".

Type depository. MNHUB.

Distribution. CALIFORNIA: Santa Barbara Co. (K. Hagen, pers. comm.).

Chilocorus bipustulatus (L.)

Fig. 537a-d

Coccinella bipustulata L., 1758, p. 367.

Chilocorus bipustulatus: Mulsant, 1846, p. 170.—Crotch, 1874b, p. 185.—Smith, 1915, p. 523.—Essig, 1931, p. 291.—Clausen et. al., 1978, pp. 69, 80, 84, 85, 100, 101, 113, 115, 116, 121.

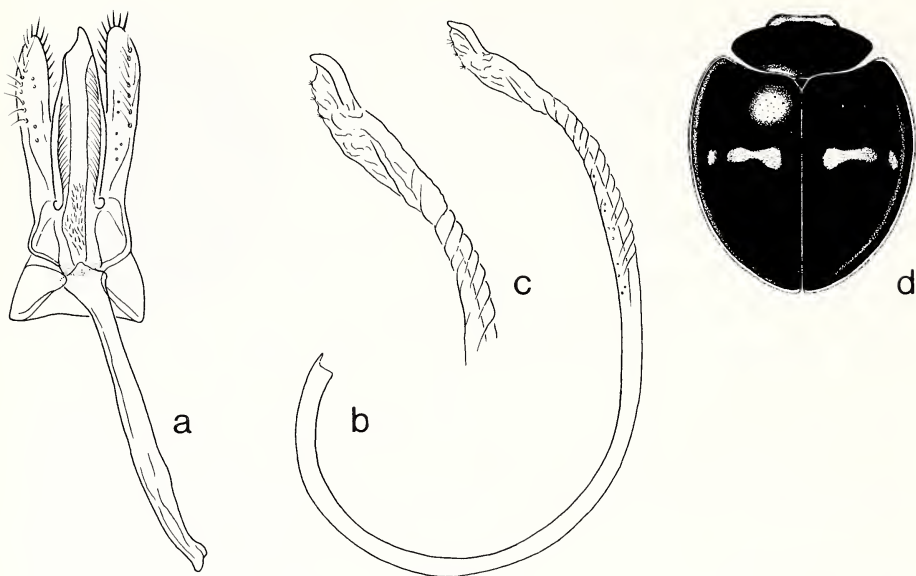


Fig. 537. *Chilocorus bipustulatus*.

Diagnosis. Length 3.0 to 4.50 mm, width 3.10 to 4.0 mm. Form oval, tapered posteriorly, moderately convex. Color light to dark brown dorsally, elytron with narrow, irregular band of 3 partially connected spots on disc, external spot often free (Fig. 537d), venter light brown to black except prosternum, mesosternum, and metasternum usually black. Dorsal surface smooth, polished, punctures fine, distinct. Male genitalia as in Figure 537a-c.

Discussion. The dorsal color pattern is diagnostic, being unlike that of any other imported or native species. This species has been imported from Europe and is now established in the San Joaquin Valley of California (pers. comm. K. Hagen). Huffaker and Doutt (1965) state that *C. bipustulatus* is established in 3 California counties; Fresno, Madera, and Merced.

Type locality. "Europa".

Type depository. Type not examined.

Distribution. CALIFORNIA: San Joaquin Valley.

Subfamily Coccidulinae

Coccidulinae Sasaji, 1968, p. 22.—J. Chapin, 1974, p. 52.—Belicek, 1976, p. 293.
Trichosomides Mulsant, 1846, p. 27.—Mulsant, 1850, p. 696 (in part).

Coccinellidae with dorsum weakly or moderately convex, pubescent. Head capsule normal; apex truncate; clypeus expanded or not; compound eye sometimes coarsely faceted; apical segment of maxillary palpus usually strongly divergent apically and securiform. Antenna 8 to 11-segmented. Meso- and metasternum narrowly articulated. Epipleuron usually broad and entire without distinct foveae (except Azyini). Female genital plates very elongate.

Sasaji (1968) included 4 tribes in this subfamily, all of which are represented in North America except the tribe Lithophilini. He did not mention the tribe Azyini which I here include in this subfamily. The host preferences of the New World members of the Coccidulinae are not well known, but they are apparently scale predators for the most part.

KEY TO TRIBES OF COCCIDULINAE

1. Abdomen with 5 visible sterna 2
- Abdomen with 6 visible sterna 3
- 2(1). Epipleuron with deep foveae for reception of femoral apices of middle and hind legs; eye undivided Azyini
- Epipleuron not foveate; eye almost completely divided (Fig. 550a) Exoplectrini
- 3(1). Antenna 8-segmented, weakly clubbed, short (Fig. 546a); tarsus trimerous; apex of clypeus thickened, narrower than labrum (Fig. 547a) Noviini
- Antenna 10 or 11-segmented, strongly clubbed, long (Fig. 538a); tarsus cryptotetramerous; apex of clypeus not thickened, wider than labrum Coccidulini

Tribe Coccidulini

Coccidulini Costa, 1849, p. 9, 104.—Casey, 1899, p. 74, 162.—Korschefsky, 1931, p. 80.—Sasaji, 1968, p. 23.—J. Chapin, 1974, p. 52.—Belicek, 1976, p. 293.

Rhizobiars Mulsant, 1846, p. 261.—Mulsant, 1850, p. 938.

Coccidulians Mulsant, 1846, p. 266.—Mulsant, 1850, p. 1007.

Coccidulides Crotch, 1873, p. 363.

Rhizobiides Crotch, 1874, p. 288.

Rhizobiini Weise, 1885a, p. 6.—Casey, 1899, p. 161.

Rhizobiinae Della Beffa, 1912, p. 167.

Coccidulina Jacobson, 1916, p. 969.

Coccidulinae of widely varying size, length ranging from 2.0 to 7.50 mm; form elongate, slender, or oval. Gena not extending onto eye; eye finely or coarsely faceted. Antenna inserted laterally beside eye, insertion exposed, 10 or 11-segmented, very elongate with loose 3-segmented club. Prosternum with intercoxal process narrow, bicarinate. Leg slender, not angulate or dentate. Tarsus cryptotetramerous. Abdomen with 6 visible sterna.

Two genera represent this tribe in America north of Mexico. One genus, *Coccidula*, is European with one American representative; the other, *Rhizobius*, is represented by 2 species introduced from Australia as biocontrol agents. The long, slender antenna, slender, unarmed legs and undivided eye distinguish this tribe from the Noviini and Exoplectrini to which it is most closely related. There are many Old World genera in the Coccidulini and it is probable that this tribe will be further divided when these genera have been completely studied.

KEY TO GENERA OF COCCIDULINI

1. Eye extremely coarsely faceted; dorsal pubescence uniform, decumbent *Coccidula* Kugelann
- Eye moderately coarsely faceted; dorsal pubescence composed of mostly decumbent hairs with some long, erect hairs scattered throughout *Rhizobius* Stephens

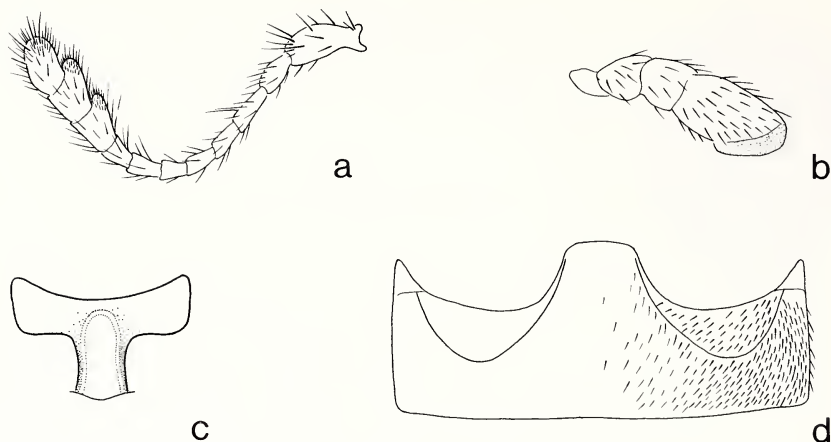


Fig. 538. *Coccidula lepida*. a. Antenna. b. Maxillary palpus. c. Prosternum. d. Postcoxal lines.

Genus *Coccidula* Kugelann

Coccidula Kugelann, 1798, p. 421.—Mulsant, 1850, p. 1007.—LeConte, 1852, p. 130.—Crotch, 1874b, p. 300.—Casey, 1899, p. 162.—Korschefsky, 1931, p. 81.—Wingo, 1952, p. 22.—Belicek, 1976, p. 321. Type-species; *Chrysomela scutellata* Herbst, 1783, by subsequent designation of Crotch, 1874b.
Strongylus Panzer, 1813, p. 114.
Cacidula Curtis, 1827, p. 114.
Cacicula Stephens, 1828, p. 319.

Coccidulini with form extremely elongate, slender (Fig. 539f); dorsal pubescence short, decumbent. Antenna long, slender, 11-segmented, club serrate, 3-segmented (Fig. 538a). Head mostly exposed; eye coarsely faceted; apical segment of maxillary palpus securiform (Fig. 538b). Prosternum with carinae joined apically (Fig. 538c). Epipleuron narrow, not descending externally. Tarsal claw with feeble tooth. Postcoxal line complete, as in *Pullus* (Fig. 538d). Male genitalia symmetrical; female genitalia lacking infundibulum (Fig. 539e).

The key characters will separate *Coccidula* from *Rhyzobius*; in addition, *Coccidula* has the prosternal carinae joined apically, the body is more slender and elongate and the head mostly exposed. Most species of this genus are European with one, *lepida* LeConte, occurring in North America. Members of this genus are said to be scale predators, but I have not seen any host data to prove or disprove this statement. There has been no modern taxonomic treatment of *Coccidula*.

Coccidula lepida LeConte Fig. 539a-g; Map, Fig. 540

Coccidula lepida LeConte, 1852, p. 132.—Crotch, 1874b, p. 301.—Horn, 1895, p. 113.—Casey, 1899, p. 162.—Korschefsky, 1931, p. 82.—Dodge, 1938, p. 222.—Wingo, 1952, p. 45.

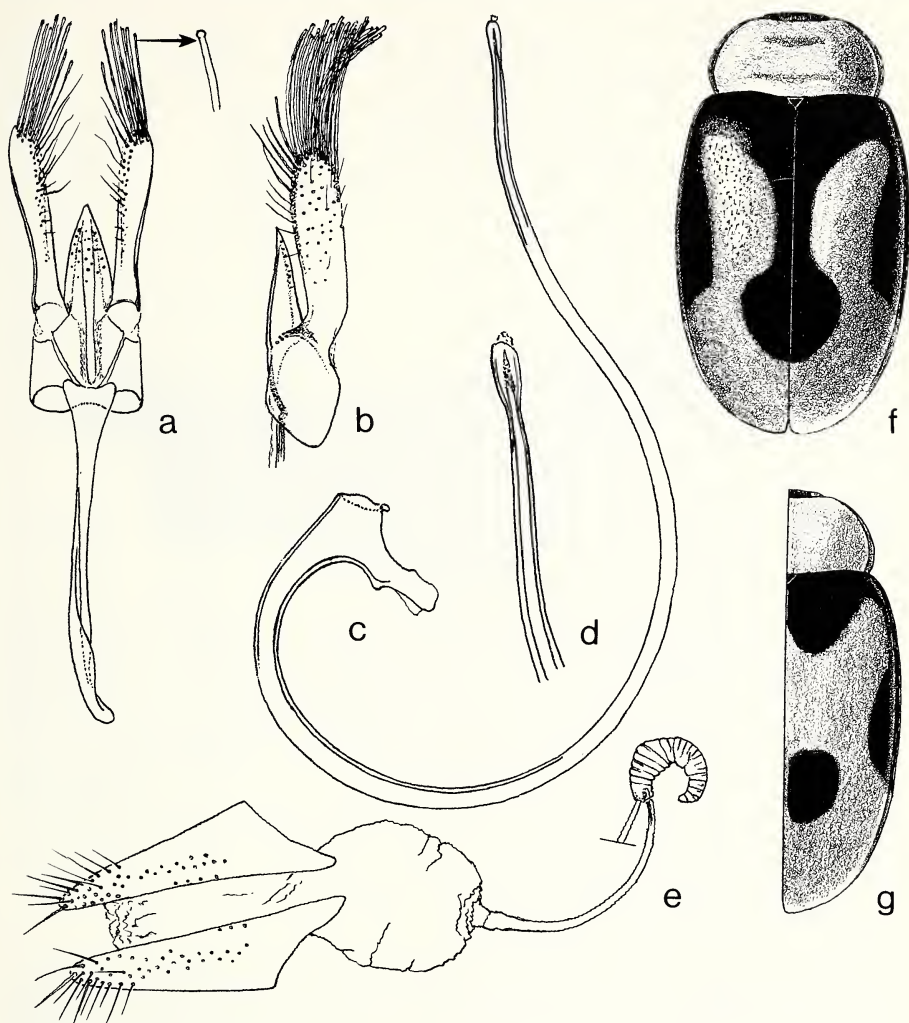


Fig. 539. *Coccidula lepida*.

Coccidula lepida var. *suturalis* Weise, 1895, p. 132.—Casey, 1899, p. 163.—Korschefsky, 1931, p. 82.—Dodge, 1938, p. 221.

Coccidula occidentalis Horn, 1895, p. 114.—Weise, 1898c, p. 238.—Frost, 1920, p. 231.—Korschefsky, 1931, p. 82.—Dodge, 1938, p. 222.—Belicek, 1976, p. 321.

New Synonymy.

Coccidula suturalis Reitter, 1897, p. 127 (not *suturalis* Weise, 1895).

Coccidula suturalis: Leng, 1920, p. 215.—Dodge, 1938, p. 222.—Wingo, 1952, p. 22.

Coccidula reitteri Dodge, 1938, p. 222 (unnecessary replacement name for *suturalis* Reitter, 1897).

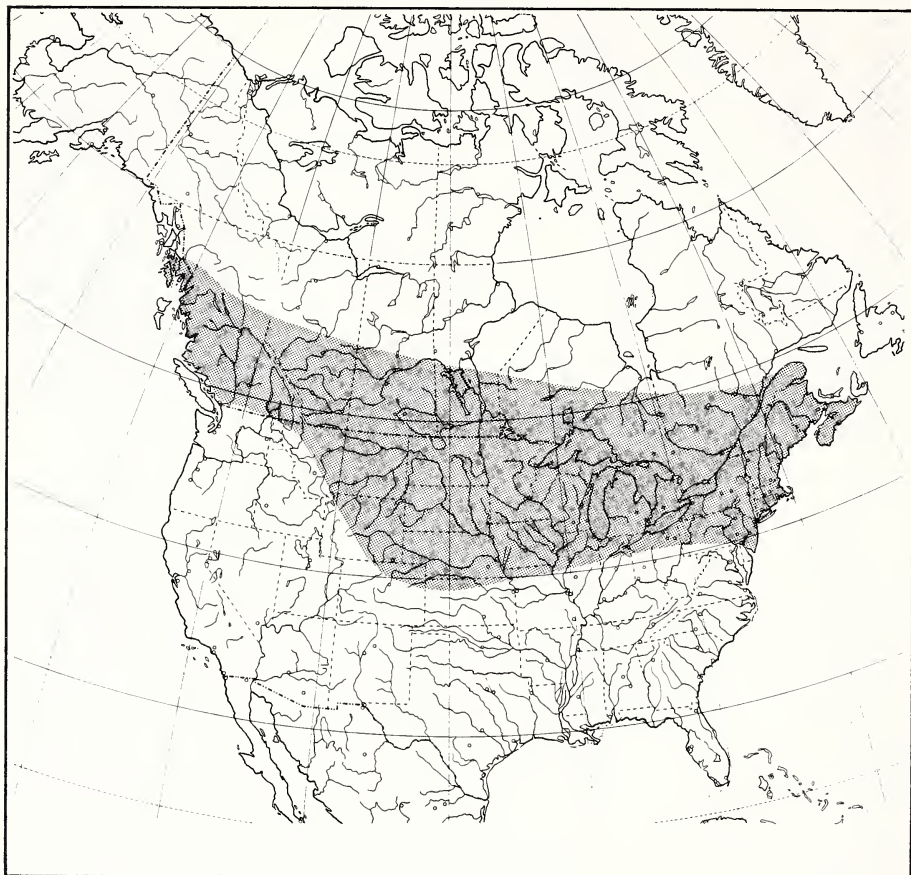


Fig. 540. Distribution. *Coccidula lepida*.

Diagnosis. Length 2.75 to 3.45 mm, width 1.50 to 1.85 mm. Form extremely elongate, parallel sided. Color yellow; head, pro-, meso- and metasterna, and basal 2 abdominal sterna black; epipleuron piceous; elytron yellow with black maculation as in Figure 539f, color pattern variable (Fig. 539g). Male genitalia as in Figure 539a-d. Female genitalia as in Figure 539e.

Discussion. The generic characteristics are sufficient to distinguish this species because it does not closely resemble any other North American species. This species is most similar to the European *C. scutellata* (Herbst), but the male genitalia are quite different in each species. *Coccidula occidentalis* Horn (*suturalis* Weise) is a junior synonym of *lepida*. The male genitalia are identical in the nominate forms and the dorsal color patterns are almost identical except that the apical spots are connected to the base along the suture in *C. occidentalis* (Fig. 539f). LeConte stated that he had one type specimen of *C. lepida*. That specimen, a female, labeled "(white disc)/4641/Type 6748 (red paper)/*coccidula lepida* LeC." must be considered the

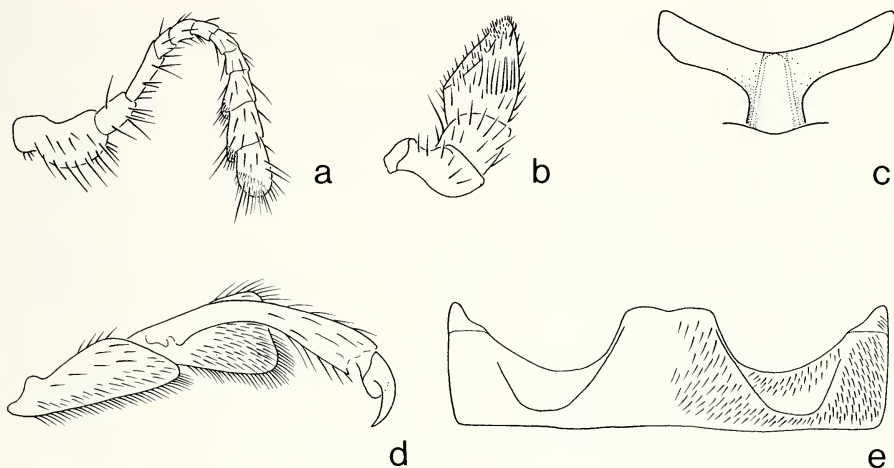


Fig. 541. *Rhyzobius* sp. a. Antenna. b. Maxillary palpus. c. Prosternum. d. Tarsus. e. Postcoxal lines.

holotype. Horn (1895) had several specimens when he described *C. occidentalis*, 6 of which are now in the Horn collection. The first of these, a female labeled "Van./Lectotype 3217/*C. occidentalis* Horn" is here designated and labeled as the lectotype, the remaining 5 are designated as paralectotypes.

Type locality. Of *lepida*, Vermont; of *occidentalis*, Vancouver, B.C. (lectotype here designated).

Type depository. Of *lepida* and *occidentalis*, MCZ.

Distribution. Figure 540. Quebec to New Jersey, west to Alaska and Colorado.

Genus *Rhyzobius* Stephens

Rhyzobius Stephens, 1829, p. 239.—Stephens, 1832, p. 396.—Pope, 1981, p. 22.

Type-species; *Nitidula litura* F., 1787, by monotypy.

Rhizobius Stephens, 1832, p. 373 (error).—Leng, 1920, p. 214.—Korschefsky, 1931, p. 88.

Rhizobius Agassiz, 1846, p. 325 (unjustified emendation).

Lindorus Casey, 1899, p. 161.—Leng, 1920, p. 214.—Chapin, 1974, p. 52.—Pope, 1981, p. 22. Type-species; *Scymnus lophanthae* Blaisdell, 1892, by monotypy.

Rhizobiellus Oke, 1951, p. 21 (unnecessary replacement name for *Rhizobius* Agassiz, 1846 (not Burmeister, 1835)).

Coccidulini with form elongate or oval; dorsal pubescence composed of dense, decumbent hairs with sparse, erect hairs intermixed. Antenna long, slender, 11-segmented, club serrate (Fig. 541a). Head partly concealed beneath pronotum; eye moderately coarsely faceted; apical segment of maxillary palpus securiform (Fig. 541b). Prosternum with carinae widely separated, usually not joined apically (Fig. 541c). Epipleuron narrow, not descending externally. Tarsus cryptotetramerous; tar-

sal claw not toothed, slightly angulate at base (Fig. 541d), or appendiculate at least on hind leg. Postcoxal line on first abdominal sternum complete, as in *Pullus* (Fig. 541e).

The partly concealed head and dual type of pubescence distinguish *Rhyzobius* from the genera of North American Scymnini which it superficially resembles. This is an Old World genus with 2 species having been introduced and established in North America for biocontrol purposes. These species have been considered as belonging in separate genera, *Lindorus* Casey and *Rhyzobius*, but Pope (1981) synonymized *Lindorus* with *Rhyzobius*. Species of *Rhyzobius* (at least the Australian species) are apparently scale feeders on such species as *Aonidiella aurantii* (Maskell), *Chrysomphalus dictyospermi* (Morgan), *Coccus hesperidum* L., *Fiorinia theae* Green, *Planococcus citri* (Risso), *Pseudaulacaspis pentagona* (Targioni-Tozzetti), *Pseudococcus acaciae* (Maskell), *Pseudococcus calceolariae* (Maskell), *Pseudococcus maritimus* (Ehrhorn), *Quadraspidiotus perniciosus* (Comstock), *Saissetia oleae* (Olivier). The European *Rhyzobius litura* (F.) has been recorded as feeding on the aphids *Dactynotus cirsii* (L.), *Dactynotus jaceae* (L.), *Macrosiphum avenae* (F.).

KEY TO SPECIES OF *Rhyzobius*

1. Ventral surface and leg black except abdomen red *forestieri* (Mulsant)
- Ventral surface including leg red or yellow *lophanthae* (Blaisdell)

Rhyzobius lophanthae (Blaisdell)

Fig. 542a–e; Map, Fig. 543

Scymnus lophanthae Blaisdell, 1892, p. 51.—Riley, 1892, p. 127.

Rhizobius lophanthae: Horn, 1895, p. 112.—Essig, 1911, p. 518.—Weise, 1923, p. 149.

Lindorus lophanthae: Casey, 1899, p. 162.—Korschefsky, 1931, p. 86.— Clausen, 1956b, p. 109.—J. Chapin, 1974, p. 53.

Lindorus lophantae: Leng, 1920, p. 214 (misspelling).

Rhizobius toowoombae Blackburn, 1892, p. 254.—Horn, 1895, p. 112.

Rhyzobius lophanthae: Pope, 1981, p. 22.

Diagnosis. Length 1.70 to 2.85 mm, width 1.35 to 2.0 mm. Form elongate, oval (Fig. 542e). Color yellowish brown; pronotum light reddish brown, elytron dark reddish brown with faint, green metallic tint. Male genitalia as in Figure 542a–c. Female genitalia as in Figure 542d.

Discussion. This species was introduced into California from Australia in 1892 for control of the black scale. It has been highly successful against a variety of scales, not only in California, but in other areas of the United States as indicated in Figure 543. Blaisdell stated that he had many specimens of this species and one, a female labeled “Coronado, Cal., XI-3-90/F.E. Blaisdell collector/female sign/Blaisdell collection/Allotype lophanthe Blais. (red paper)”, is designated as the lectotype. Eight other specimens, all bearing the same locality data, are designated and labeled as paralectotypes.

Type locality. Coronado, California (lectotype here designated).

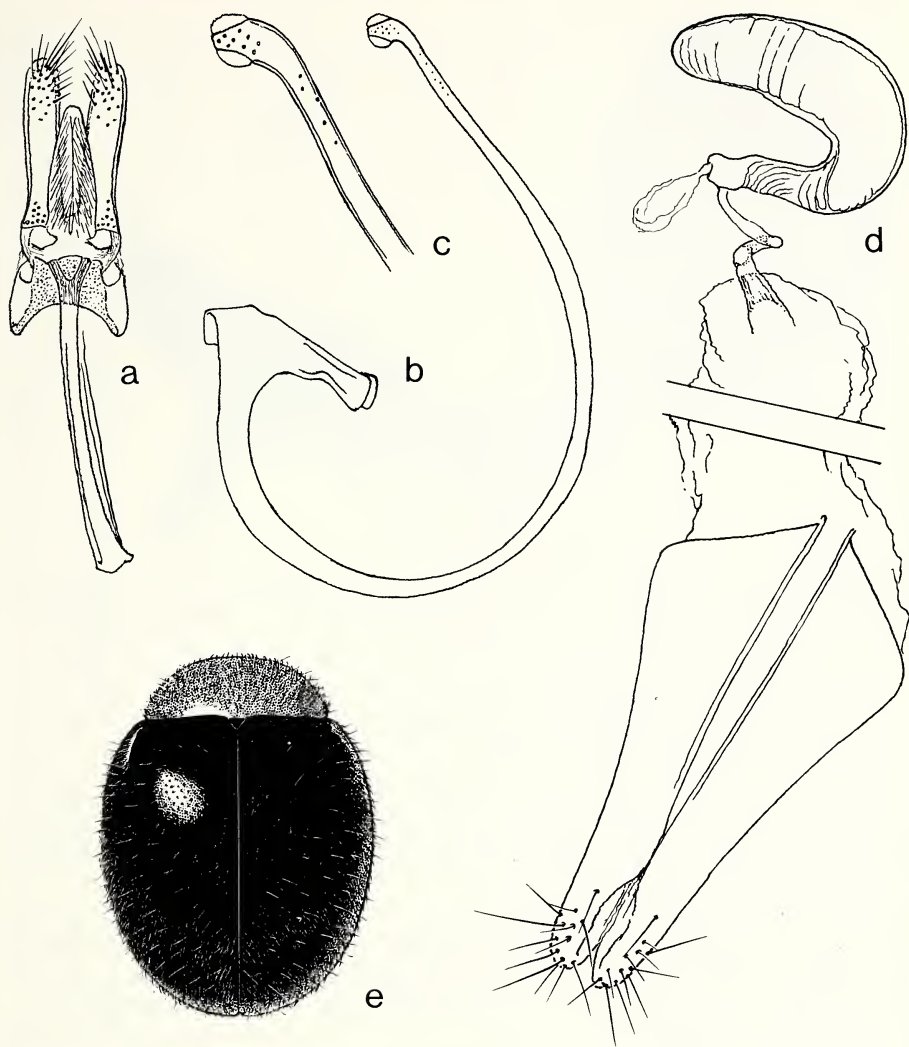


Fig. 542. *Rhyzobius lophanthae*.

Type depository. CAS.

Distribution. Figure 543. Maryland to Florida, west to California.

Rhyzobius forestieri (Mulsant)
Fig. 544a-e, 545; Map, Fig. 543

Platyomus forestieri Mulsant, 1853, p. 158.

Scymnodes forestieri: Korschevsky, 1931, p. 85.

Scymnus circularis Sharp, 1889, p. 365.—Pope, 1981, p. 26.

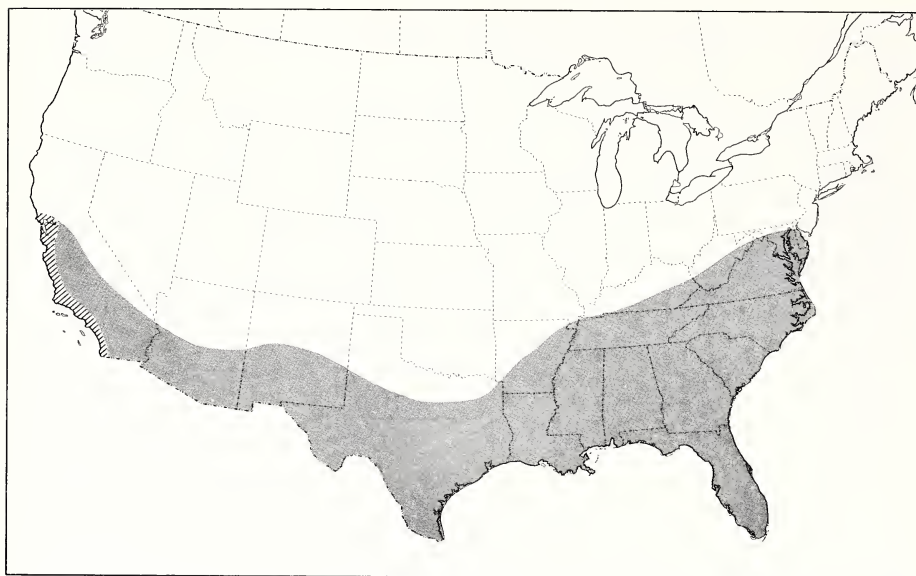


Fig. 543. Distribution. *Rhizobius lophanthae* (shaded, southern); *R. forestieri* (cross hatch).

Rhizobius ventralis: sensu auct.

Lindorus ventralis: Timberlake, 1927, p. 532.

Rhizobius forestieri: Pope, 1981, p. 26.

Diagnosis. Length 2.60 to 3.70 mm, width 1.90 to 2.30 mm. Form oval, lateral border of pronotum and elytron discontinuous (Fig. 544e). Color black except mouthparts and abdomen yellow or reddish. Male genitalia as in Figure 544a–c. Female genitalia as in Figure 555.

Discussion. *Rhizobius forestieri* was introduced into California in 1892 under the name *R. ventralis* Erichson for control of lecaniine scales (Coccidae). It was released at Santa Barbara and San Jose and is now established in coastal California. Unlike *R. lophanthae*, it apparently has not spread to other parts of the United States.

Type locality. Australia.

Type depository. Of *forestieri*, PM; of *circularis*, BMNH.

Distribution. Figure 543. Coastal California.

Tribe Noviini

Noviini Gangelbauer, 1899, p. 954.—Leng, 1920, p. 214.—Mader, 1924, p. 7.—Korschefsky, 1931, p. 96.—Sasaji, 1968, p. 26.—Gordon, 1972a, p. 23.—J. Chapin, 1974, p. 53.—Belicek, 1976, p. 293.

Coccidulinae with form broad, somewhat oblong; dorsal surface pubescent. Head directed ventrally, not deeply inserted in pronotum; clypeus thick with labrum on

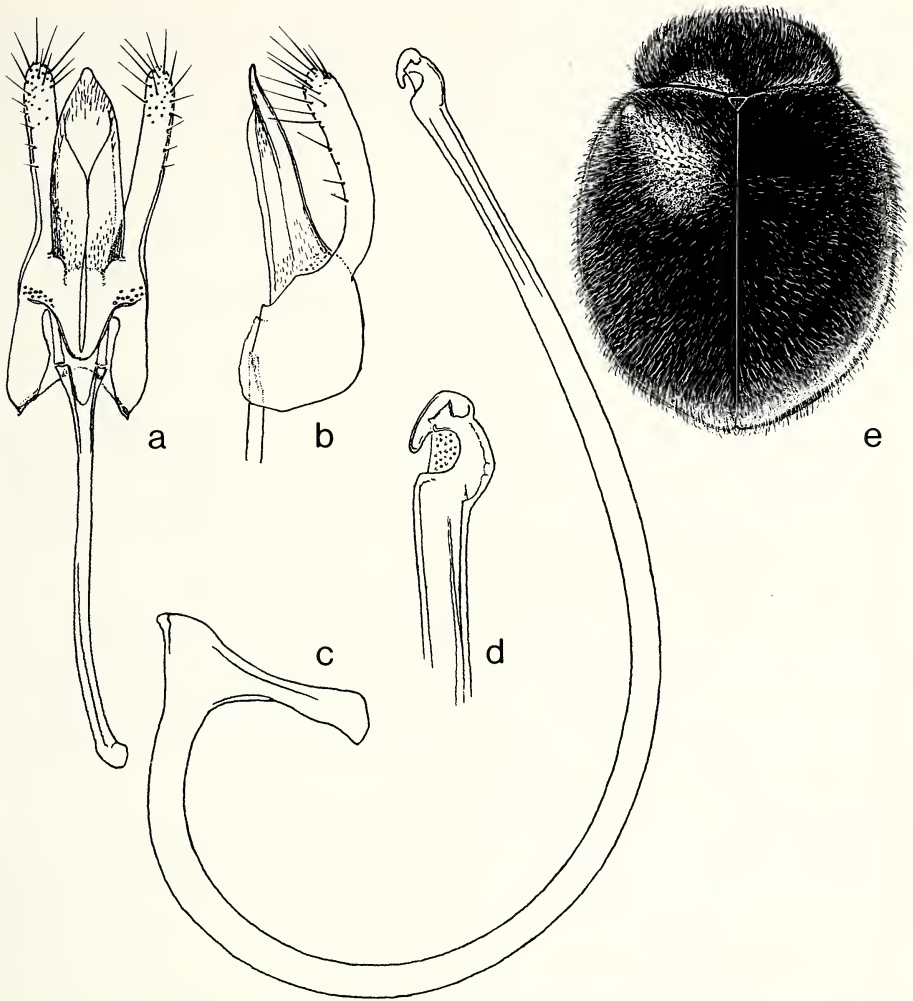


Fig. 544. *Rhyzobius forestieri*.

lower plane than clypeus; gena not extending onto eye. Antennal insertion concealed; antenna 8-segmented with club weakly 3-segmented, basal 2 segments large. Apical segment of maxillary palpus large, strongly securiform. Epipleuron obliquely inclined with external margin lower than internal margin, not foveate for reception of legs. Prosternum raised medially, protuberant, narrowly separating anterior coxae. Anterior femur deeply emarginate for reception of tibia, middle and hind femora less so; tibia on all legs compressed laterally, with weak external angulation at basal $\frac{1}{3}$; tarsus trimerous. Abdomen with 6 visible sterna; postcoxal line on first sternum complete or nearly so; apex of 6th sternum in male emarginate medially. Male

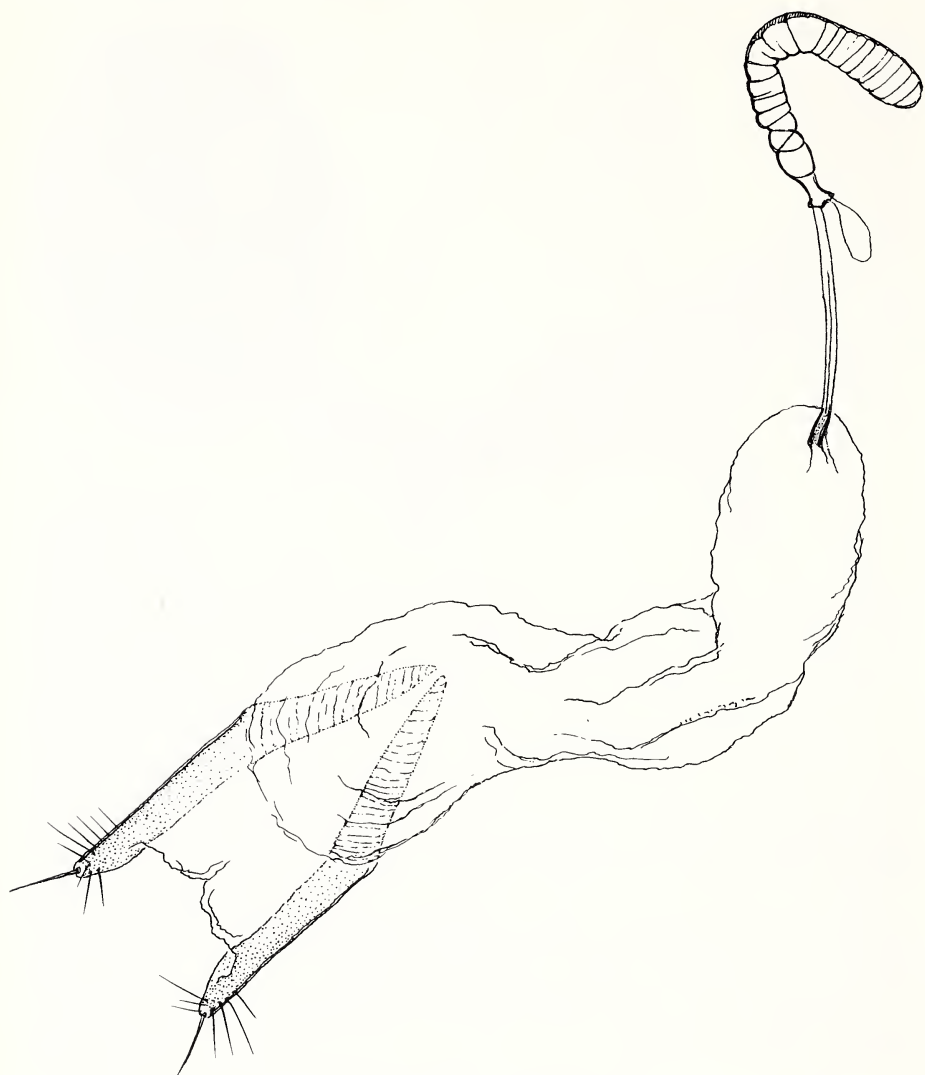


Fig. 545. *Rhyzobius forestieri* (female genitalia).

genitalia symmetrical. Female genitalia with spermathecal capsule short, stout, lacking infundibulum.

There are 2 genera of this tribe in the New World, one (*Anovia*) native and one (*Rodolia*) introduced for biocontrol purposes. The 6-segmented abdomen, protuberant prosternal process, and unequal planes of the clypeus and labrum distinguish the Noviini. The New World members of the tribe were treated by Gordon (1972a).

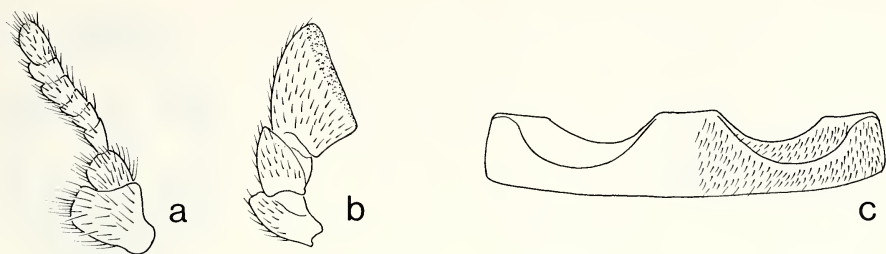


Fig. 546. *Rodolia cardinalis*. a. Antenna. b. Maxillary palpus. c. Postcoxal lines.

KEY TO GENERA OF NOVIINI

1. Postcoxal line complete (Fig. 546c); labrum flat, slightly emarginate anteriorly (Fig. 547a) *Rodolia* Mulsant
- Postcoxal line incomplete (Fig. 549e); labrum convex, apical margin broadly, feebly concave *Anovia* Casey

Genus *Rodolia* Mulsant

Rodolia Mulsant, 1850, p. 902.—Crotch, 1874b, p. 280.—Korschefsky, 1931, p. 98.—Gordon, 1972a, p. 25.—J. Chapin, 1974, p. 53. Type-species; *Rodolia ruficollis* Mulsant, by subsequent designation of Crotch, 1874b.

Rodolia (*Macronovius*) Weise, 1885a, p. 63.—Weise, 1895b, p. 149.—Sicard, 1907b, p. 68.

Noviini with antenna as in Figure 546a. Labrum flat (Fig. 547) or concave, anterior margin usually feebly emarginate. Maxillary palpus as in Figure 546b. Prosternal protuberance margined apically, densely pubescent. Abdomen with postcoxal line on first sternum complete (Fig. 546c); 6th sternum of male with apical emargination strong.

See Gordon (1972a) for a more detailed discussion of this genus in the New World. The tribe is composed of a group of very closely related genera and it is difficult to separate them satisfactorily except in the larval stage. The postcoxal line is definitely complete in *Rodolia*, narrowly incomplete in *Anovia*. *Rodolia cardinalis*, the only species of *Rodolia* occurring in the United States, was introduced into California from Australia in 1888 for control of the cottony cushion scale, *Icerya purchasi* Maskell. It has since been introduced and become established in many parts of the world. *Rodolia koebelei* (Coquillett) was also introduced into California from Australia in 1891, but does not exist there now, although it was thought to have been established for some time.

Species of *Rodolia* prey primarily on scales of the genus *Icerya*. Recorded hosts include *Icerya purchasi* Maskell, *Icerya seychellarum* (Westwood), *Pseudococcus* sp., *Pseudaulacaspis pentagona* (Targioni-Tozzetti).

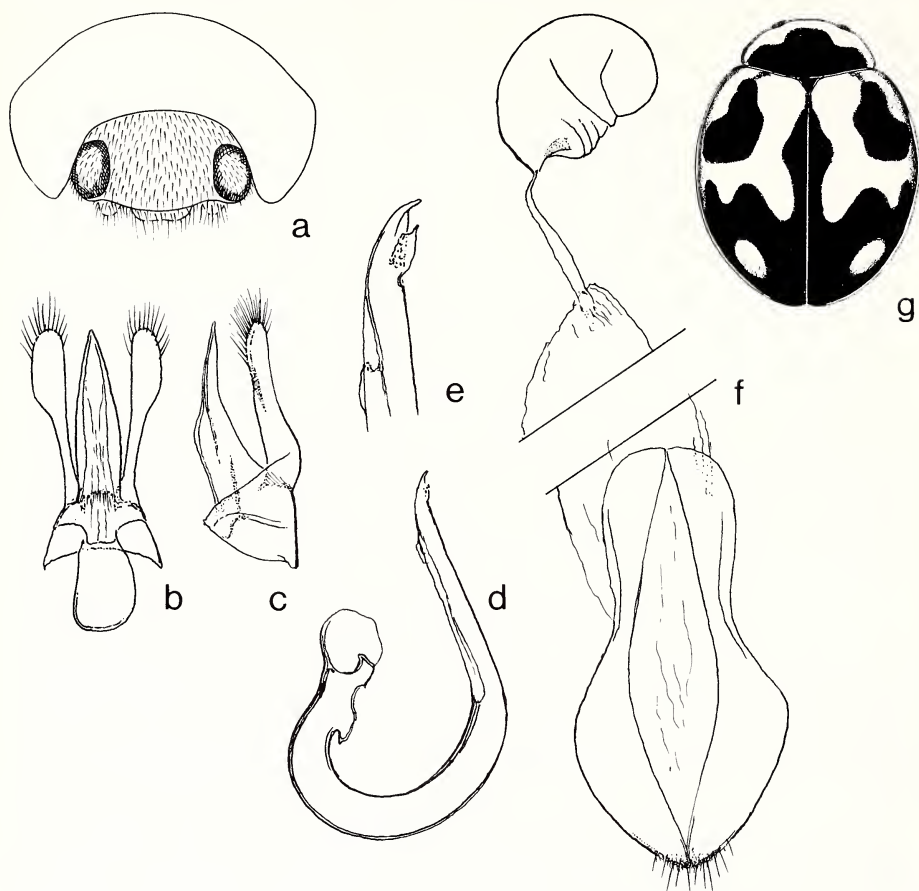


Fig. 547. *Rodolia cardinalis*.

Rodolia cardinalis (Mulsant)

Fig. 547a-g; Map, Fig. 548

Vedalia cardinalis Mulsant, 1850, p. 906.

Rodolia cardinalis: Weise, 1905, p. 220.—J. Chapin, 1974, p. 54. (for detailed synonymy see Gordon, 1972a, p. 25).

Diagnosis. Length 2.65 to 4.18 mm, width 2.00 to 3.33 mm. Form elongate, elytron nearly parallel sided, widest at middle. Color red; basal area of pronotum and head black; meso- and metasternum, femur and median area of basal 2 abdominal sterna piceous; elytron with black maculation (Fig. 547g). Male genitalia as in Figure 547b-e. Female genitalia as in Figure 547f.

Discussion. See Gordon (1972a) for a discussion of this species. In addition to the characters used in the generic key, *R. cardinalis* can usually be distinguished from *A. virginalis* by body form. *Anovia virginalis* is definitely widest just posterior to the

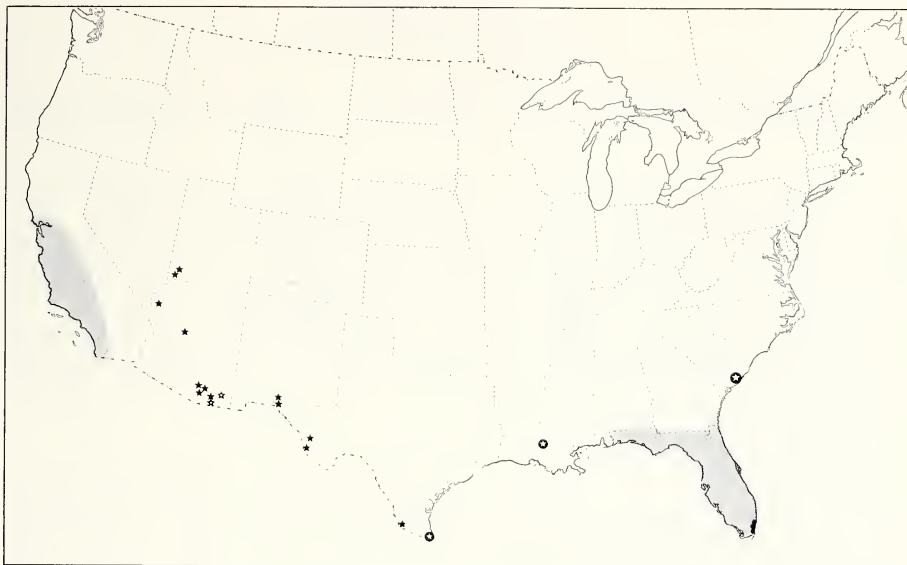


Fig. 548. Distribution. *Rodolia cardinalis* (shaded, disjunct localities circled star); *Anovioa virginalis* (star); *Exoplectra schaefferi* (open star); *Azya orbigera* (dot).

humeral callus; *R. cardinalis* is widest at the middle of the elytra. This species is definitely established in California and Florida. The data listed is from actual specimens examined.

Type locality. New Holland.

Type depository. Oxford University.

Distribution. Figure 548. CALIFORNIA: San Francisco Bay area to San Diego. LOUISIANA: Baton Rouge. SOUTH CAROLINA: Charleston. TEXAS: Brownsville.

Genus *Anovioa* Casey

Anovioa Casey, 1908, p. 408.—Leng, 1920, p. 214.—Korschefsky, 1931, p. 96.—Gordon, 1972a, p. 26. Type-species; *Scymnus virginalis* Wickham, by monotypy.

Noviini with description as for *Rodolia* except labrum convex, apical margin broadly, feebly concave; prosternal protuberance not margined apically, pubescence sparse; abdomen with postcoxal line on first sternum narrowly incomplete (Fig. 549e); 6th abdominal sternum of male with apical emargination feeble.

Anovioa is the only genus of the Noviini native to the New World, and it closely resembles *Rodolia* (see discussion under *Rodolia*, and Gordon, 1972a, pp. 27, 28). There are 6 described species in this genus, only one of which, *A. virginalis*, occurs north of Mexico. The remainder are neotropical. Scale species recorded as hosts for members of *Anovioa* are *Steatococcus plucheae* (Cockerell), *Icerya purchasi* Maskell, *Icerya rileyi* Cockerell, and *Icerya montserratensis* Riley and Howard.

Anovia virginalis (Wickham)

Fig. 549a-g; Map, Fig. 548

Scymnus virginalis Wickham, 1905, p. 166.*Anovia virginalis*: Casey, 1908, p. 408.—Korschevsky, 1931, p. 96.—Gordon, 1972a, p. 27.

Diagnosis. Length 2.43 to 3.05 mm, width 2.00 to 2.44 mm. Form elongate, oval, widest anterior to middle of elytron. Color red; pronotum except anterior angle, head, and basal portion of femur piceous; elytron typically with a median red spot and subhumeral red area (Fig. 549f), variation in pattern shown in Figure 549g. Male genitalia as in Figure 549a-c. Female genitalia as in Figure 549d.

Discussion. There are 5 cotypes of *virginalis* in the USNM collection. One of these, a male, is here designated as the lectotype and so labeled. The remaining 4 types are designated as paralectotypes.

Type locality. Chad's Ranch, Utah (lectotype here designated).

Type depository. USNM (50212).

Distribution. Figure 548. ARIZONA: Benson; Capitan Mt.; Cottonwood; Mojave Co., Hualapai Mts.; Sabino Canyon foothills; Santa Rita Range Exp. Sta.; Tombstone; Tucson. NEW MEXICO: Mesilla Valley. TEXAS: El Paso; Finlay; Presidio; Rio Grande City. UTAH: Leeds.

Tribe Exoplectrini

Exoplectrini Casey, 1908, p. 407.—Korschevsky, 1932, p. 225.—Blackwelder, 1945, p. 450.—Sasaji, 1968, p. 26.

Chnoodiares Mulsant, 1850, p. 907.

Exoplectrae Crotch, 1874b, p. 280.

Exoplectrides Gorham, 1895, p. 211.

Exoplectrinae Weise, 1904, p. 362.

Coccidulinae of widely varying size, length ranging from 2.0 to 8.0 mm. Head deeply inserted in pronotum; clypeus extending well beyond antennal insertion, apex broadly emarginate (Fig. 550a); gena extending onto eye, nearly completely dividing eye. Antenna inserted under clypeal margin anterior to eye, 11-segmented, club large, asymmetrical, 3-segmented, basal segment extremely large, laterally compressed (Fig. 550b). Apical segment of maxillary palpus large, strongly securiform (Fig. 550c). Mandible with 2 strong apical teeth and a large basal tooth. Epipleuron broad, obliquely inclined, not foveate for reception of leg. Prosternum flat, simple, narrowly separating coxae. Leg variable, with or without external angulation at base of tibia. Tarsus cryptotetramerous; tarsal claw strongly bifid (Fig. 550d). Abdomen with 5 visible sterna. Postcoxal line on first abdominal sternum complete or incomplete (Fig. 550e, f).

Exoplectra is the only representative of this tribe occurring north of Mexico. There are 4 other genera as well as *Exoplectra* represented in the Neotropical region and 5 genera known from the Old World. The New World genera are closely similar to each other with the essential characteristics of the head and antennae virtually identical. The partially divided eyes, pubescent dorsum, large basal segment of the antenna, and partially concealed head characterize this tribe.

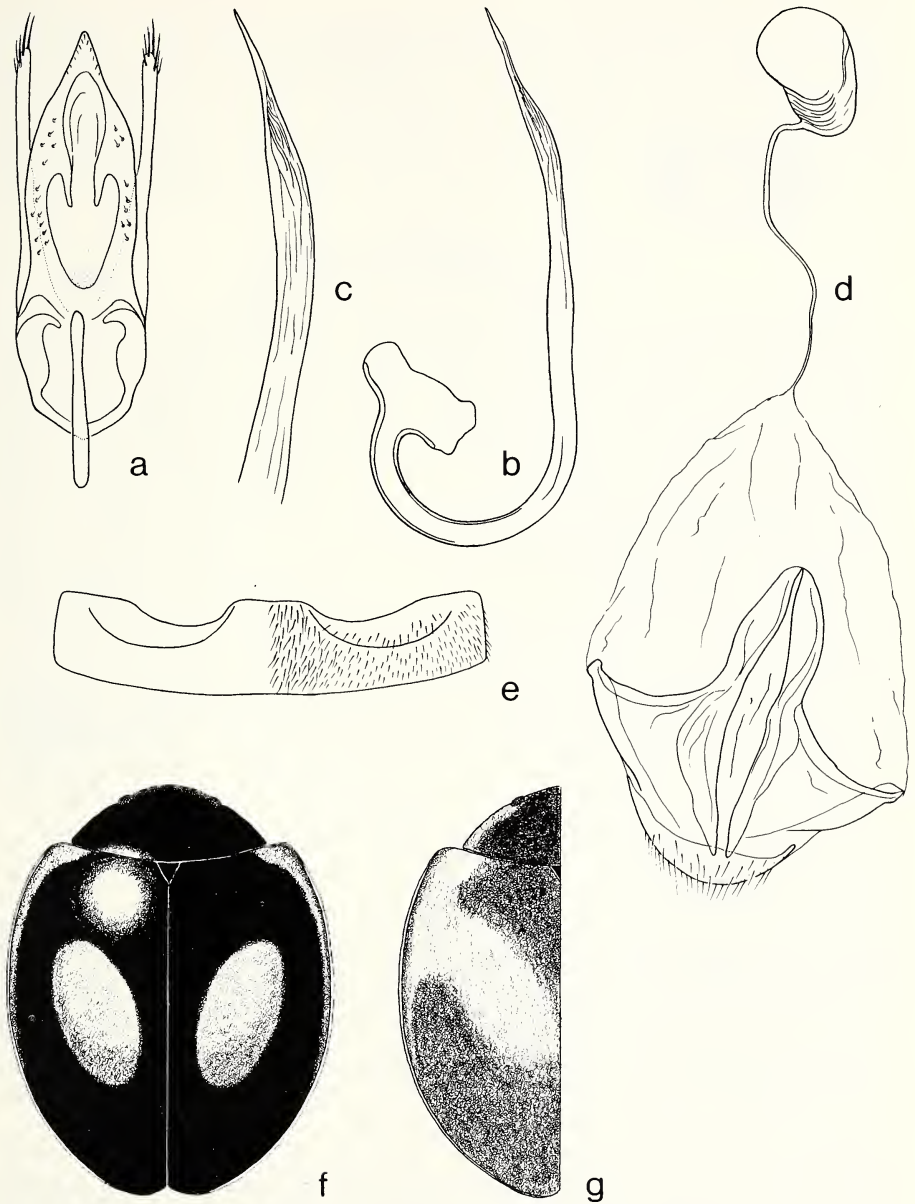


Fig. 549. *Anovia virginalis*.

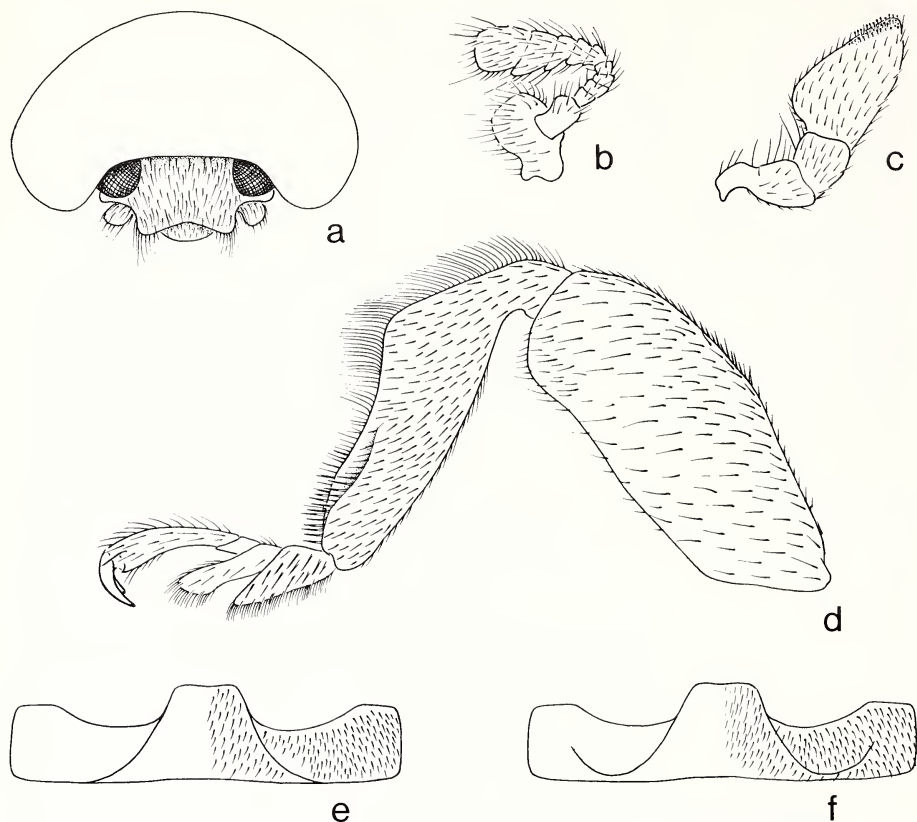


Fig. 550. *Exoplectra* sp. a. Head. b. Antenna. c. Maxillary palpus. d. Front tibia.

Genus *Exoplectra*

Exoplectra Chevrolat, 1837, p. 461.—Mulsant, 1850, p. 916.—Crotch, 1874b, p. 284.—Korschefsky, 1932, p. 227.—Blackwelder, 1945, p. 450. Type-species; *Coccinella coccinea* Fabricius, 1801, by subsequent designation of Korschefsky, 1932.

Exoplectrini with tibia angulate or almost dentate externally at base (Fig. 550d). Postcoxal line incomplete. Male genitalia simple, symmetrical. Female genitalia lacking infundibulum, accessory gland present.

Exoplectra schaefferi, new species, is the only representative of this genus occurring north of Mexico. The tribal characteristics cause it to be easily recognized as there are no similar appearing coccinellids in this region. This species has been known as *E. subaenescens* Gorham since Schaeffer (1905) recorded it from Arizona. I have examined the type series of *subaenescens* in the BMNH and find that the Arizona species of *Exoplectra* is not *subaenescens* nor any presently described species of that genus. I have not seen any host data for members of this genus except one record in Schilder and Schilder (1928) of a species feeding on "*Aleurodicus cocois*." I seriously

doubt that members of this genus (or tribe) feed on whiteflies because of the robust mandibular structure and lack of confirming evidence. The absence of host data and the presence of large, strong teeth on the mandible causes me to suspect that they may be plant feeders rather than predators. I have collected a series of an undescribed species of *Exoplectra* in Peru, apparently making feeding marks on bamboo leaves, but the act of feeding could not be positively established. There has been no modern taxonomic treatment of members of this genus.

***Exoplectra schaefferi*, new species**

Fig. 551a–d, 552a, b; Map, Fig. 548

Description. Male, length 4.20 mm, greatest width 3.29 mm. Form elongate, oval, feebly convex (Fig. 552b). Color yellowish red; elytron dark brown with brassy green tint; head and median $\frac{3}{4}$ of pronotum black; meso- and metasternum dark brown, epipleuron reddish brown. Dorsum densely pubescent with grayish white, decumbent hairs. Punctures on head moderately coarse, separated by a diameter. Punctures on pronotum fine, separated by one to 3 times a diameter. Elytral punctation very coarse, dense, punctures separated by less than a diameter, nearly contiguous. Punctures on ventral surface very fine, sparse, widely separated. Leg with external tibial angulation feeble, most pronounced on anterior tibia. Postcoxal line incomplete, of the *Pullus* type. Genitalia as in Figure 551a–d.

Female, similar to holotype except length 4.0 mm, width 3.20 mm; color pale yellow; postcoxal line of the *Diomus* type; genitalia as in Figure 552a.

Variation. Length 2.75 to 4.20 mm, width 2.25 to 3.29 mm. The normally yellowish red color is a paler yellow in some specimens.

Holotype. Male. ARIZONA: Huachucha Mts., VII-15, from Ch. Schaeffer, *Exoplectra subaenescens* Gorh. (USNM 101347).

Allotype. Female. ARIZONA: Palmerly, Cochise Co., VIII-17. (USNM).

Paratypes. Total 4 (Fig. 548). ARIZONA: Huachucha Mts.; Palmerly, Cochise Co., VI. (USNM).

The specimens described here are the same specimens that Schaeffer identified as *E. subaenescens*. *Exoplectra schaefferi* is very similar to *subaenescens* in external appearance, but the male genitalia are quite different. In addition, the elytral punctures of *E. subaenescens* are much finer than those of *E. schaefferi*, and the areas that are normally yellowish red in *E. schaefferi* are always yellow in *E. subaenescens*. The type locality of *E. subaenescens* is Ventanas, in Durango, Mexico, and I have not seen it from any other locality. This species is named for Charles Schaeffer who collected and described several coccinellids from the southwestern United States.

Tribe Azyini

Azyini Schilder and Schilder, 1928, p. 217.—Korschefsky, 1932, p. 230.—Balduf, 1935, p. 152.—Blackwelder, 1945, p. 451.—Gordon, 1980, p. 153.

Azyaires Mulsant, 1850, p. 927.

Azyae Crotch, 1874b, p. 279.

Coccidulinae with form compact; dorsal surface black, pubescent, without color pattern except many species with spots formed from brown and white pubescence.

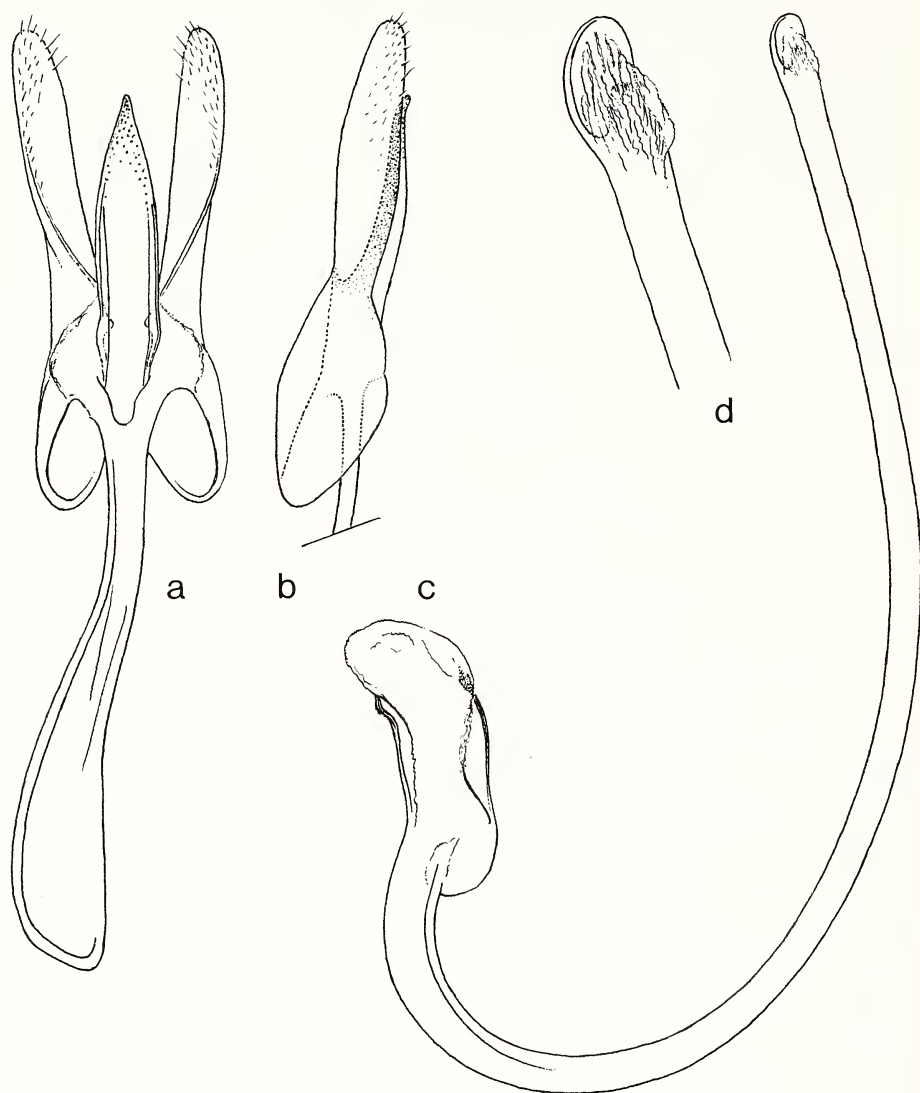


Fig. 551. *Exoplectra schaefferi* (male genitalia).

Head deeply inserted under pronotum; apex of clypeus emarginate medially; gena only slightly extending onto eye; antennal insertion mostly exposed (Fig. 553a). Antenna 11-segmented, club 3-segmented, asymmetrical, each club segment with small papilla on outer angle (Fig. 553b). Apical segment of maxillary palpus barrel-shaped (Fig. 553c). Pronotum with anterolateral angle thickened, obtuse (Fig. 553a). Epipleuron deeply notched for reception of femur. Leg broad, flat; anterior tibia with

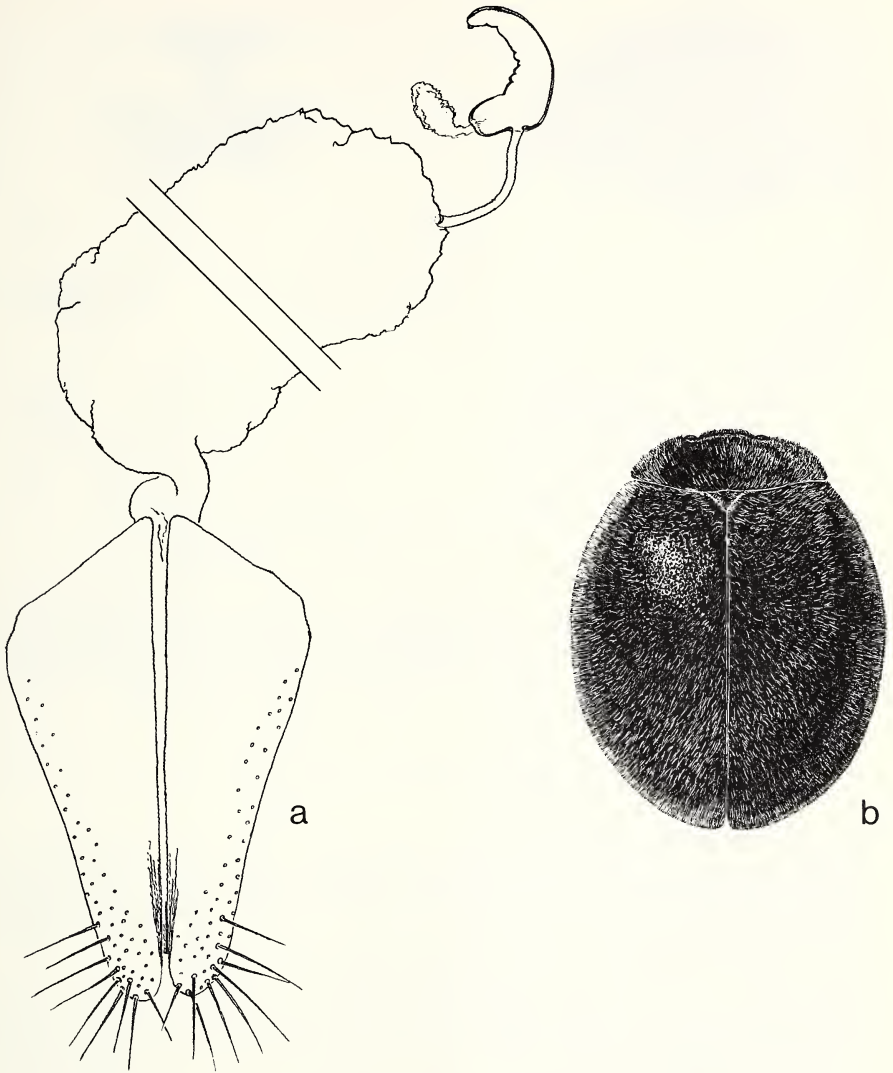


Fig. 552. *Exoplectra schaefferi* (female genitalia and habitus).

dually rounded external border (Fig. 553d). Tarsus cryptotetramerous (Fig. 553d); claw with tooth near apex (Fig. 553e). Abdomen with 5 visible sterna; postcoxal line of first sternum incomplete (Fig. 554b). Female genitalia without infundibulum, spermatheca without development of ramus or nodulus.

Members of this tribe most nearly resemble members of the Exoplectrini and Noviini. Members of the Noviini have simple legs without the armature found in the Azyini. Some members of the Exoplectrini have legs similar to those found in

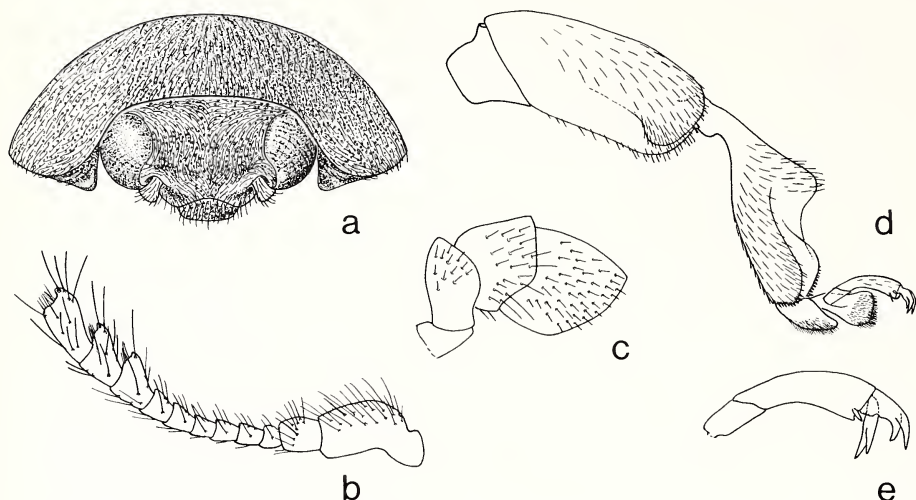


Fig. 553. *Azya* sp. a. Head. b. Antenna. c. Maxillary palpus. d. Front leg.

the Azyini, but all members of the Exoplectrini have a broad, flat, basal antennal segment and the clypeal structure is quite different. In addition, characters diagnostic for the Azyini are the obtuse anterolateral angle of the pronotum and the papillae on the antennal club segments.

KEY TO GENERA OF AZYINI

1. Prosternum with intercoxal process elevated, narrow (Fig. 554a); apex of male siphon with ventral flap before apex (Fig. 555d) *Azya* Mulsant
- Prosternum with intercoxal process flat, not elevated (Fig. 556a); apex of male siphon bifid (Fig. 557d) *Pseudoazyia* Gordon

Genus *Azya* Mulsant

Azya Mulsant, 1850, p. 928.—Crotch, 1874b, p. 279.—Schilder and Schilder, 1928, p. 245.—Korschefsky, 1932, p. 230.—Blackwelder, 1945, p. 451.—Chapin, 1965b, p. 246.—Woodruff and Sailer, 1977, p. 1.—Gordon, 1980, p. 155. Type-species; *Azya luteipes* Mulsant, by subsequent designation of Crotch, 1874b.

Azyini with length ranging from 2.90 to 4.40 mm. Form oval. Dorsal surface black except male head yellow, often with metallic lustre; clothed with dense, appressed pubescence, pubescence short or long, usually white with spot on elytron composed of brown hairs. Venter usually black or piceous except leg and abdomen yellow. Prosternum lobed anteriorly, partially concealing mouthparts, deeply excavated at side for reception of antenna, intercoxal process elevated, narrow, bicarinate or medially ridged (Fig. 554a). Male genitalia with paramere slender; apex of siphon

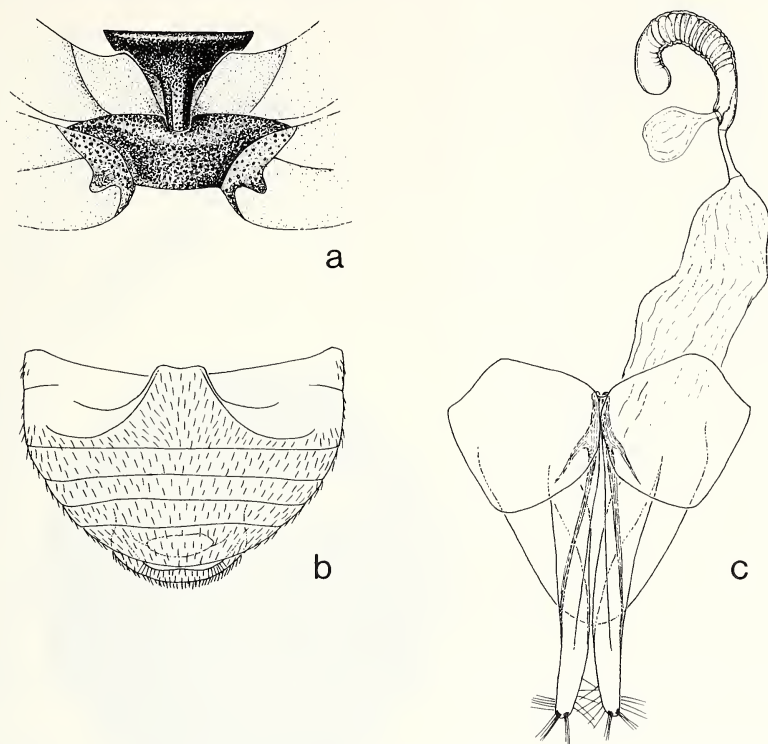


Fig. 554. *Azya* sp. a. Prosternum. b. Abdomen. c. Female genitalia.

slender, with ventral flap before apex. Female genitalia with apex of spermathecal capsule broader than base; genital plate extremely elongate, triangular (Fig. 554c).

This is a distinctive genus in the North American fauna. The antennal club with papillae, strong armature of the legs, and deeply foveate epipleuron render it easily recognizable. All species of *Azya* are neotropical but one species, *A. trinitatis* Marshall (now in *Pseudozya*), was introduced into Florida from Trinidad in 1938 for control of the coconut scale (*Aspidiotus destructor* Signoret). This species is probably not established now, but a survey taken in 1939 showed that it was established at that time. A second species, *A. orbigera orbigera* Mulsant, has recently (1976) been collected in the vicinity of Miami. Specific host records for this scale feeding genus are as follows; *Asterolecanium bambusae* (Boisduval), *Asterolecanium miliaris* (Boisduval), *Aulacaspis tubercularis* (Newstead), *Coccus viridis* (Green), *Dysmicoccus brevipes* (Cockerell), *Ferrisia virgata* (Cockerell), *Lecanium* sp., *Lecanium viride* Green, *Parasaissetia nigra* (Nietner), *Pseudococcus* sp., *Saissetia coffeae* (Walker), *Saissetia oleae* (Olivier), *Selenaspidius* sp. *Azya* was revised by Gordon (1980), see that publication for detailed discussion.

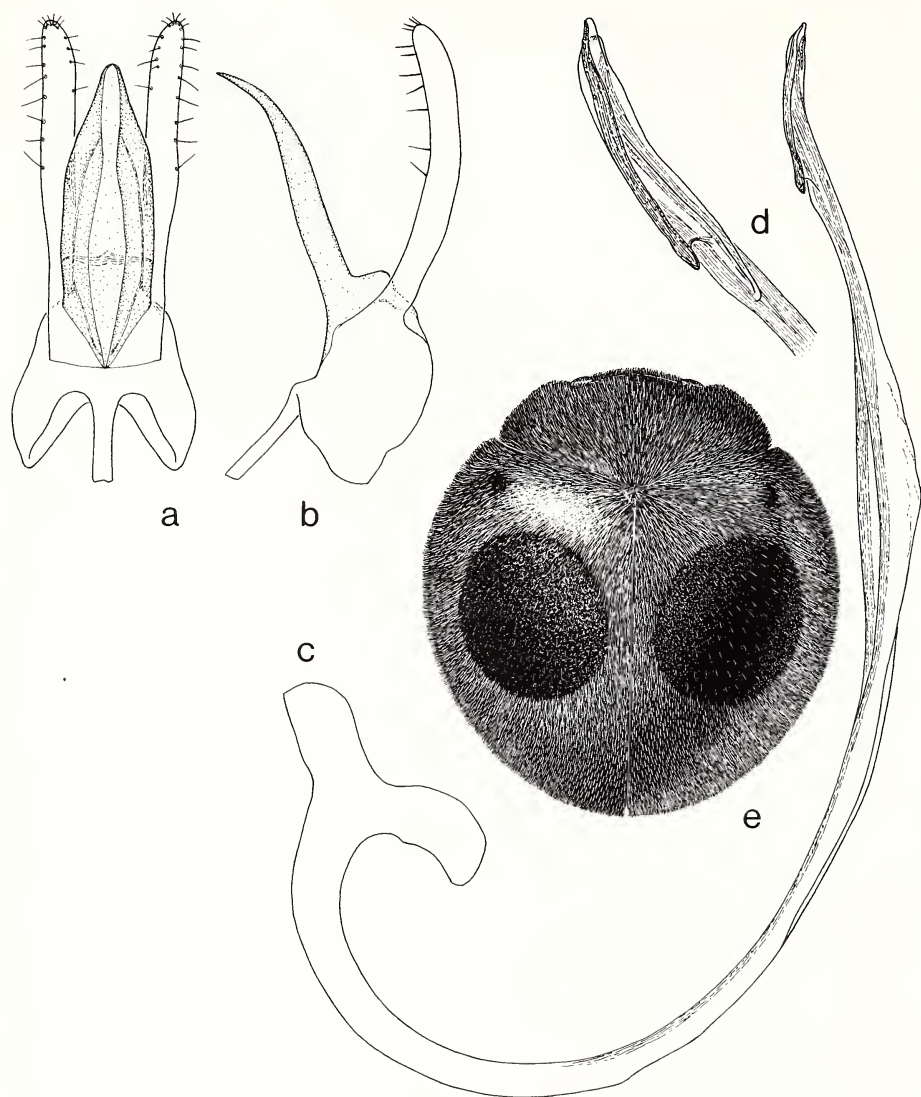


Fig. 555. *Azya orbigera*.

Azya orbigera orbigera Mulsant

Fig. 555a-e; Map, Fig. 548

Azya orbigera Mulsant, 1850, p. 930.—Crotch, 1874b, p. 279.—Gorham, 1895, p. 211.—Korschefsky, 1932, p. 230.—Blackwelder, 1945, p. 451.—Wolcott, 1950, p. 310.—Chapin, 1965b, p. 247.—Leeper, 1976, p. 286.

Azya orbigera orbigera: Gordon, 1980, p. 157.

Azya luteipes: Woodruff and Sailer, 1977, p. 1 (not *luteipes* Mulsant, 1850).

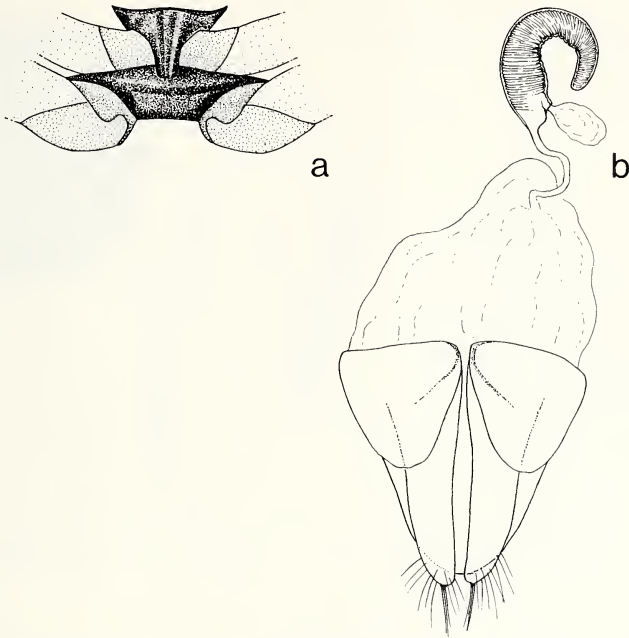


Fig. 556. *Pseudoazya* sp. a. Prosternum. b. Female genitalia.

Diagnosis. Length 2.90 to 4.25 mm, width 2.50 to 3.45 mm. Form oval. Head yellow; dorsum greenish black, each elytron with round discal spot (Fig. 555e); venter black except leg and abdomen yellow. Male genitalia as in Figure 555a–d.

Discussion. This is the only species of *Azya* that is known to be established in the United States (see Gordon, 1980), apparently the result of an accidental introduction. I originally identified this species as *A. luteipes* Mulsant, but subsequent examination of the type specimens proved this identification to be incorrect.

Type locality. Colombia (lectotype designated by Gordon, 1980).

Type depository. UCCC.

Distribution. Figure 548. FLORIDA: Boca Raton; Dania; Davie; Ft. Lauderdale; Hollywood; Miami; North Miami; Pompano Beach; West Palm Beach.

Genus *Pseudoazya* Gordon

Pseudoazya Gordon, 1980, p. 192. Type-species; *Azya trinitatis* Marshall, by original designation.

Description as for *Azya* except length range from 2.20 to 2.65 mm; form nearly round (Fig. 557e); male head black or mostly black; dorsal pubescence appressed or erect; prosternum short, flat, intercoxal process not elevated or ridged (Fig. 556a). Male genitalia with paramere paddle-shaped, apex of siph bifid; female spermathecal capsule with apex narrower than base, genital plate somewhat elongate, shorter than in *Azya* (Fig. 556b).

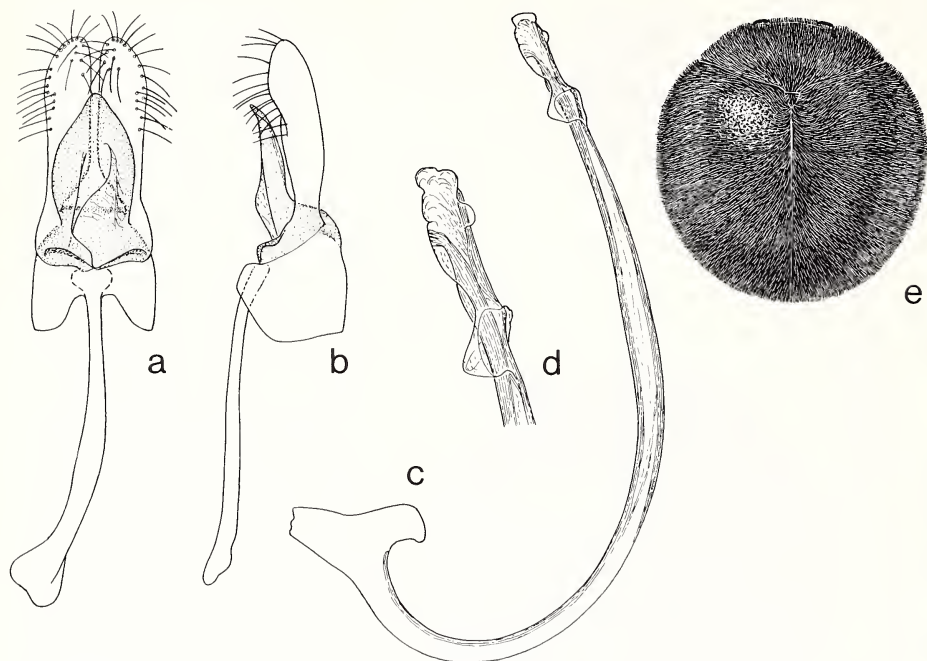


Fig. 557. *Pseudoazya trinitatis*.

Pseudoazya trinitatis (Marshall)

Fig. 557a-e

Azya trinitatis Marshall, 1912, p. 320.—Korschefsky, 1932, p. 231.—Taylor, 1935, p. 70.—Dohanian, 1937, p. 246.—Clausen, 1939, p. 340.—Clausen, 1940, p. 573.—Blackwelder, 1945, p. 451.—Wolcott, 1950, p. 310.—Cochereau, 1969, p. 57.—Woodruff and Sailer, 1977, pp. 1-2.

Pseudazya trinitatis: Gordon, 1980, p. 194.

Diagnosis. Length 2.35 to 2.65 mm, width 2.0 to 2.38 mm. Form nearly round, subdepressed (Fig. 557e). Head greenish black except apex of clypeus yellow; pronotum greenish black; elytron bluish black; venter black except leg and abdomen yellow. Male genitalia as in Figure 557a-d.

Discussion. This species was released in the Miami, Florida, area in 1938. Specimens were taken in 1939, but there is no evidence to suggest that *A. trinitatis* survived in Florida after 1939.

Type locality. Cedros, Trinidad (lectotype designated by Gordon, 1980).

Type depository. BMNH.

Distribution. See discussion above.

Subfamily Coccinellinae

Coccinellinae Ganglbauer, 1899, pp. 954, 986.—Della Beffa, 1912, p. 167.—Mader, 1924, p. 6.—Korschefsky, 1931, p. 79.—Wingo, 1952, p. 16.—Sasaji, 1968, p. 21.—J. Chapin, 1974, p. 54.

Aphidiphages LaPorte, 1840, p. 523.—Chevrolat, 1849, p. 43.
 Gymnosomides Mulsant, 1846, p. 27.—Mulsant, 1850, p. 2 (in part).
 Coccinelliti Costa, 1849, p. 9.
 Coccinellidae Crotch, 1873, p. 363.—Crotch, 1874b, p. 53.
 Coccinellides Aphidiphages Chapuis, 1876, p. 166.
 Coccinellidae Aphidiphages Weise, 1885a, p. 4.

Coccinellidae with dorsal surface glabrous; size medium to large. Mandible with single basal tooth, apex bifid or with several teeth arranged in a row. Apical segment of maxillary palpus securiform. Mentum narrowly articulated with submentum, expanded apically. Antenna long, 11-segmented, inserted more or less dorsally. Prosternum T-shaped. Mesosternum narrowly articulated with metasternum. Mesepimeron triangular, posterior margin feebly bent. Each femur elongate, not flattened; each leg simple, free. Tarsus cryptotetramerus. Female genital plate with stylus near inner angle of plate, inner margin lacking distinct emargination. Male genitalia with siphon long, usually strongly curved with well developed capsule.

This subfamily contains the species referred to as "ladybeetles" in the classic sense. These are the commonly collected "aphid" predators that are often red with black spots. I follow Sasaji (1968) in attributing only 2 tribes (Coccinellini and Psylloborini) to the subfamily, both of which are represented north of Mexico.

KEY TO TRIBES OF COCCINELLINAE

1. Gena extending onto eye (Fig. 558b); anterolateral angle of clypeus usually produced forward; mandible bifid at apex Coccinellini
- Gena not extending onto eye (Fig. 558a); anterolateral angle of clypeus not produced, apex truncate; mandible multidentate at apex Psylloborini

Tribe Coccinellini

Coccinellini Weise, 1885a, p. 7.—Casey, 1899, pp. 73, 82.—Blatchley, 1910, p. 512.—Leng, 1920, p. 215.—Korschefsky, 1932, p. 310.—Wingo, 1952, p. 23.—Watson, 1956, p. 43 (in part).—Sasaji, 1968, p. 21.—J. Chapin, 1974, p. 55.—Belicek, 1976, p. 295.

Adoniates Mulsant, 1846, p. 35.—Mulsant, 1850, p. 36.

Coccinellaires Mulsant, 1846, p. 29.—Mulsant, 1850, p. 35.

Coccinellates Mulsant, 1846, p. 35.—Mulsant, 1850, p. 74.

Coccinelliens Mulsant, 1846, p. 28.—Mulsant, 1850, p. 2.

Halyziaires Mulsant, 1846, p. 29.—Mulsant, 1850, p. 131.

Halyziates Mulsant, 1846, p. 147.—Mulsant, 1850, p. 162.

Hippodamiaries Mulsant, 1846, p. 30.—Mulsant, 1850, p. 5.

Micraspaires Mulsant, 1846, p. 162.—Mulsant, 1850, p. 212.

Mysiates Mulsant, 1846, p. 125.—Mulsant, 1850, p. 132.

Aliziarrii Costa, 1849, p. 11.

Hippodamiini Costa, 1849, p. 10.—Weise, 1885a, p. 6.—Casey, 1899, pp. 73, 75.—Blatchley, 1910, p. 509.—Wingo, 1952, p. 22.—Watson, 1956, p. 44.—Brown and de Ruette, 1962, p. 643.—Sasaji, 1968, p. 21.

Micraspidarii Costa, 1849, p. 11.

Cariaires Mulsant, 1850, p. 228.

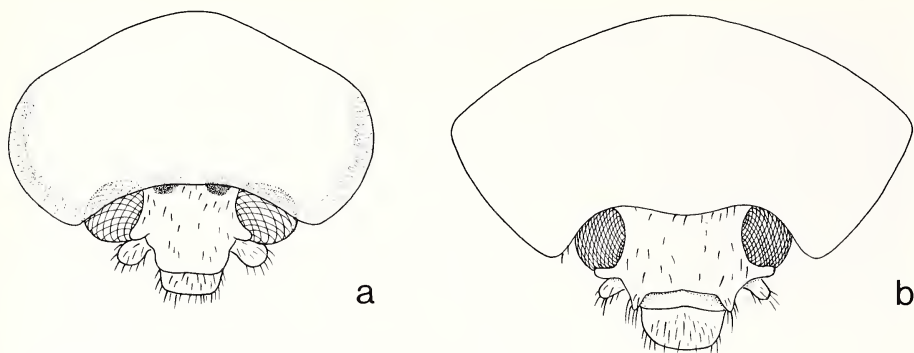


Fig. 558. a. *Psyllobora* sp. head. b. *Myzia* sp. head.

Alesiaires Mulsant, 1850, p. 343.

Coelophoraires Mulsant, 1850, p. 374.

Cydoniaires Mulsant, 1850, p. 429.

Coccinellina Thomson, 1866, p. 332.

Coccinellides Thomson, 1866, p. 332.—Crotch, 1874, p. 91.—Gorham, 1891, p. 153.

Coccinellidae Berg, 1874, p. 288.

Hippodamiidae Berg, 1874, p. 287.

Tytthaspides Crotch, 1874b, p. 181.

Cariites Chapuis, 1876, p. 166.

Coccinellites Chapuis, 1876, p. 171.

Hippodamiites Chapuis, 1876, p. 167.

Synonychini Weise, 1885a, p. 7.—Mader, 1927, p. 21.—Korschefsky, 1932, p. 268.

Halyziides Gorham, 1892, p. 161.

Synonychinae Della Beffa, 1912, p. 167.

Anisostictini Jacobson, 1916, p. 969.—Watson, 1956, p. 44.

Coccinellina Jacobson, 1916, p. 969.—Dobzhansky, 1926c, p. 1560.

Synonychina Jacobson, 1916, p. 969.—Dobzhansky, 1926c, p. 1574.

Hippodamiina Dobzhansky, 1926c, p. 200.

Coccinellinae with body length usually 3.0 mm or more. Head with gena extending onto eye (Fig. 558b); eye usually finely faceted; mandible bifid at apex; clypeus slightly narrower than frons, apex usually emarginate with anterolateral angle produced (Fig. 558b) (except in *Ceratomegilla*, *Paranaemia*, and some species of *Hippodamia*). Anterior border of pronotum deeply excavate around head.

Twenty genera represent this tribe north of Mexico. Several of these genera are holarctic, and representatives of some are neotropical. The tribe is extremely widespread worldwide and the generic divisions are not as sharply defined as in most other coccinellid tribes. The key characters plus the deeply excavated pronotum and finely faceted eyes distinguish the Coccinellini from the Psylloborini to which it most closely related. The Coccinellini as treated here have not been taxonomically considered as a whole, but Brown and de Ruelle (1962) discussed the genera formerly placed in the tribe Hippodamiini, and Iablokoff-Khnzorian (1982) revised the tribe for the Palearctic and Oriental Regions.

KEY TO GENERA OF COCCINELLINI

1.	Tarsal claw not toothed or cleft, simply widened basally (Fig. 567a)	2
-	Tarsal claw toothed or apically cleft (Fig. 587i, 614c)	5
2(1).	Pronotal base with fine, entire marginal bead	3
-	Pronotal base not margined	4
3(2).	Metasternum with postcoxal line; elytron with large black spots (Fig. 570g)	..... <i>Naemia</i> Mulsant
-	Metasternum without postcoxal line; elytron vittate (Fig. 567g)	..... <i>Paranaemia</i> Casey
4(2).	Apex of middle and hind tibia each with 2 spurs; elytron vittate (Fig. 565f); epipleuron sloping downward internally	..... <i>Macronaemia</i> Casey
-	Apex of middle and hind tibia each with a single spur; elytron spotted or very irregularly vittate (Fig. 560f); epipleuron horizontal	..... <i>Anisosticta</i> Dejean
5(1).	Each tarsal claw cleft near apical 1/3 (Fig. 587i); form slender, legs distinctly visible beyond body in dorsal view	..... <i>Hippodamia</i> Dejean
-	Each tarsal claw with subquadrate basal tooth (Fig. 614c); or if tooth median, then form rounded, legs barely visible beyond body in dorsal view (genus <i>Myzia</i>)	..... 6
6(5).	Pronotal base with marginal bead	..... 7
-	Pronotal base without marginal bead	..... 9
7(6).	Metasternum and first abdominal sternum with distinct postcoxal line (fig. 1)	..... 8
-	Metasternum and first abdominal sternum without postcoxal line	..... <i>Coleomegilla</i> Timberlake
8(7).	Dorsal color mostly yellow, occasionally with some obscure dark markings (Fig. 680a, b)	..... <i>Aphidecta</i> Weise
-	Dorsal color pattern red and black (Fig. 579f, g)	..... <i>Ceratomegilla</i> Crotch
9(6).	Length 7.40 to 10.0 mm; form rounded, highly convex; elytron reddish yellow with 7 discrete black spots (Fig. 676a); one introduced species established in Florida	..... <i>Harmonia</i> Mulsant
-	Length usually less than 7.50 mm (except <i>Anatis</i>); other statements not as above	..... 10
10(9).	Prosternum strongly convex medially, protuberant at apex (Fig. 614b); mesosternum deeply emarginate for reception of sternal process	..... <i>Anatis</i> Mulsant
-	Prosternum normally rounded, not protuberant at apex; mesosternum truncate or weakly emarginate for reception of prosternal process	..... 11
11(10).	Postcoxal line on first abdominal sternum complete, of the <i>Pullus</i> type (Fig. 637a)	..... <i>Adalia</i> Mulsant
-	Postcoxal line on first abdominal sternum incomplete, of the <i>Diomus</i> or <i>Nephus</i> type (Figs. 634b, 682a)	..... 12
12(11).	Elytron yellow with black sutural margin and 4 black spots (Fig. 672g), spots often somewhat coalesced; Oriental genus, one species possibly established in Florida	..... <i>Coelophora</i> Mulsant
-	Elytron with color pattern not resembling that of <i>Coelophora</i> ; North American or European genera	..... 13
13(12).	Apex of each middle and hind tibia without spurs	..... <i>Mulsantina</i> Weise
-	Apex of each middle and hind tibia with 2 spurs (Fig. 626a)	..... 14
14(13).	Tarsal claw with median tooth (Fig. 626a)	..... <i>Myzia</i> LeConte
-	Tarsal claw with subquadrate basal tooth (Fig. 664b)	..... 15
15(14).	Pronotal surface polished, shiny, not alutaceous between punctures	..... <i>Calvia</i> Mulsant
-	Pronotal surface alutaceous, often dull, not polished	..... 16
16(15).	Pronotum black with a large, subtrapezoidal or triangular white spot on each	

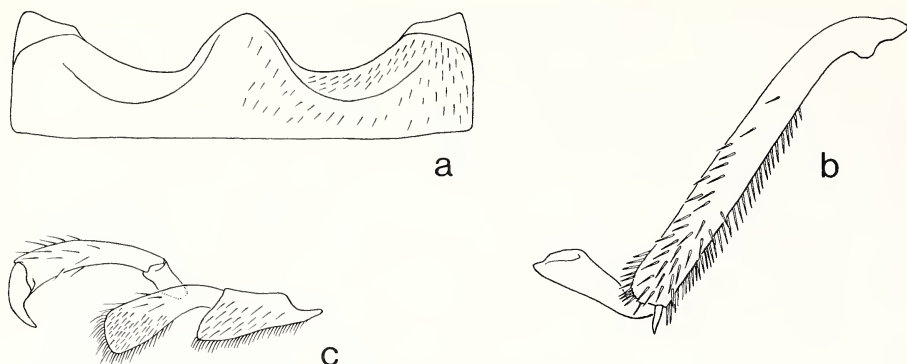


Fig. 559. *Anisosticta* sp. a. Postcoxal lines. b. Hind tibia. c. Tarsus.

- anterolateral angle (Fig. 643g) (apical margin of pronotum sometimes narrowly pale); epipleuron nearly horizontal, not descending externally *Coccinella* L.
- Pronotum not as above; epipleuron horizontal or descending externally 17
- 17(16). Postcoxal line on first abdominal sternum with oblique dividing line 18
- Postcoxal line on first abdominal sternum without oblique dividing line 19
- 18(17). Epipleuron strongly, abruptly descending externally; punctures on elytron fine, nearly invisible *Olla* Casey
- Epipleuron nearly horizontal, not abruptly descending externally; punctures on elytron coarse, dense *Neoharmonia* Crotch
- 19(17). Apex of mesosternum notched for reception of prosternal process European genus (one species) presently established only in southeastern Canada *Propylaea* Mulsant
- Apex of mesosternum truncate; occurring over most of North America from southern Canada to Mexico *Cycloneda* Crotch

Genus *Anisosticta* Dejean

Anisosticta Dejean, 1837, p. 456.—Mulsant, 1850, p. 36.—Mulsant, 1866, p. 25.—LeConte, 1852, p. 130.—Crotch, 1873, p. 369.—Crotch, 1874b, p. 93.—Wickham, 1894, p. 299.—Casey, 1899, p. 75.—Leng, 1903a, p. 36.—Blatchley, 1910, p. 510.—Korschefsky, 1932, p. 367.—Timberlake, 1943, p. 45.—Bielawski, 1958, p. 91.—Wingo, 1952, p. 22.—Brown and de Ruelle, 1962, p. 644.—Belicek, 1976, p. 351.—Iablokoff-Khnzorian, 1982, p. 113. Type-species; *Coccinella novemdecimpunctata* L., by subsequent designation of Crotch, 1874b.

Coccinellini with length 2.50 to 4.0 mm. Form elongate, dorsoventrally flattened, femur visible beyond lateral margin of elytron. Dorsal color yellow with head black basally or almost entirely; pronotum and elytron with brown or black maculae (Fig. 560f). Apex of clypeal margin truncate, anterolateral angle produced forward. Lateral margin of elytron broadly reflexed; epipleuron nearly flat. Intercoxal process of prosternum narrow with broad lateral ridge. Apical margin of mesosternum truncate, ridged. Apex of middle and hind tibiae each with a single spur (Fig. 559h). Tarsal claw widened basally, not toothed (Fig. 559c). Postcoxal line nearly complete, but

not entirely so (Fig. 559a). Male genitalia symmetrical. Female genitalia lacking infundibulum; coxal plate elongate, with strong apical stylus (Fig. 560e).

The simple tarsal claw, single tibial spur, and the dorsal color pattern characterize members of this genus. The only other genus with remotely similar habitus is *Naemia* Mulsant which has two tibial spurs and the head entirely black. *Anisosticta* is a holarctic genus with 7 names currently recognized as valid. Two of these species occur in North America. The genus was revised by Bielawski (1958) and further treated by Brown and de Ruelle (1962). The name *Anisosticta* has incorrectly been attributed to Duponchel (see comments by Brown and de Ruelle, 1962) and more recently to Dejean (Belicek, 1976). Members of *Anisosticta* are said to be aphid predators, but I have not seen any specific host data.

KEY TO SPECIES OF *Anisosticta*

1. Abdomen entirely black; mesepimeron darkened or black *borealis* Timberlake
- Abdomen with lateral margin pale; mesepimeron pale *bitriangularis* (Say)

Anisosticta bitriangularis (Say)

Fig. 560a-h; Map, Fig. 561

Coccinella bitriangularis Say, 1824, p. 269.

Anisosticta bitriangularis: Casey, 1899, p. 76.—Timberlake, 1943, p. 45.—Wingo, 1952, p. 45.—Bielawski, 1958, p. 101.—Brown and de Ruelle, 1962, p. 645.—Belicek, 1976, p. 352.—Iablokoff-Khnzorian, 1982, p. 115.

Anisosticta strigata ab. *bitriangularis*: Korschefsky, 1932, p. 373.

Coccinella multiguttata Randall, 1838, p. 51.—Mulsant, 1850, p. 35.—LeConte, 1859c, p. 197.

Anisosticta strigata multiguttata: Gemminger and Harold, 1876, p. 3744.

Anisosticta 19-punctata multiguttata: Weise, 1895a, p. 126.

Anisosticta strigata ab. *multiguttata*: Korschefsky, 1932, p. 373.

Anisosticta strigata: Crotch, 1873, p. 369.—Crotch, 1874b, p. 93.—Leng, 1903a, p. 37.—Wickham, 1894, p. 299.—Blatchley, 1910, p. 510.

Anisosticta novemdecimpunctata irregularis Weise, 1879, p. 94.—Brown and de Ruelle, 1962, p. 645.

Diagnosis. Length 3.0 to 4.0 mm, width 1.90 to 2.40 mm. Dorsal color pattern as in Figure 560f-h. Lateral margin of abdomen and meso- and metepimeron pale. Male genitalia as in Figure 560a-d. Female genitalia as in Figure 560e.

Discussion. Specimens from the southern portion of the range have the elytral and pronotal spots free. Northern specimens tend to become more heavily maculate until the most northern specimens have both elytral and pronotal spots fused into almost regular vittae (Fig. 560f). See Bielawski (1958) for a detailed discussion of the synonymy of *A. bitriangularis*. This species was considered a synonym of the European *A. strigata* by almost all authors until Casey (1899) recognized it as a valid species. Examination of the genitalia by Bielawski (1958) and Brown and de Ruelle (1962) confirm Casey's decision.

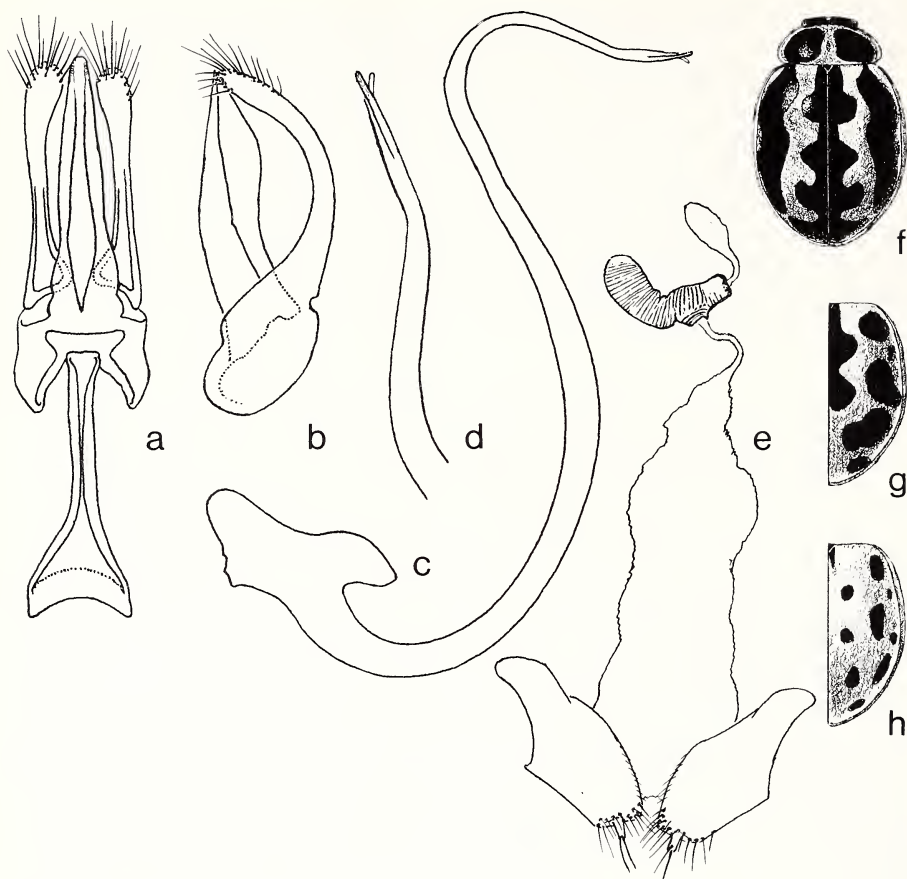


Fig. 560. *Anisosticta bitriangularis*.

Type locality. Of *bitriangularis*, "Northwest Territory"; of *multiguttata*, Cambridge, Massachusetts; of *irregularis*, Oregon.

Type depository. Of *bitriangularis*, type lost; of *multiguttata*, not located; of *irregularis*, not examined.

Distribution. Figure 561. Labrador to New Jersey, west to Alaska, California, and British Columbia.

Anisosticta borealis Timberlake

Fig. 562a-g; Map, Fig. 563

Anisosticta borealis Timberlake, 1943, p. 45.—Bielawski, 1958, p. 108.—Brown and de Ruelle, 1962, p. 645.—Belicek, 1976, p. 352.—Iablokoff-Khnzorian, 1982, p. 115.

Description as for *bitriangularis* except head mostly black; dorsal maculation heavy

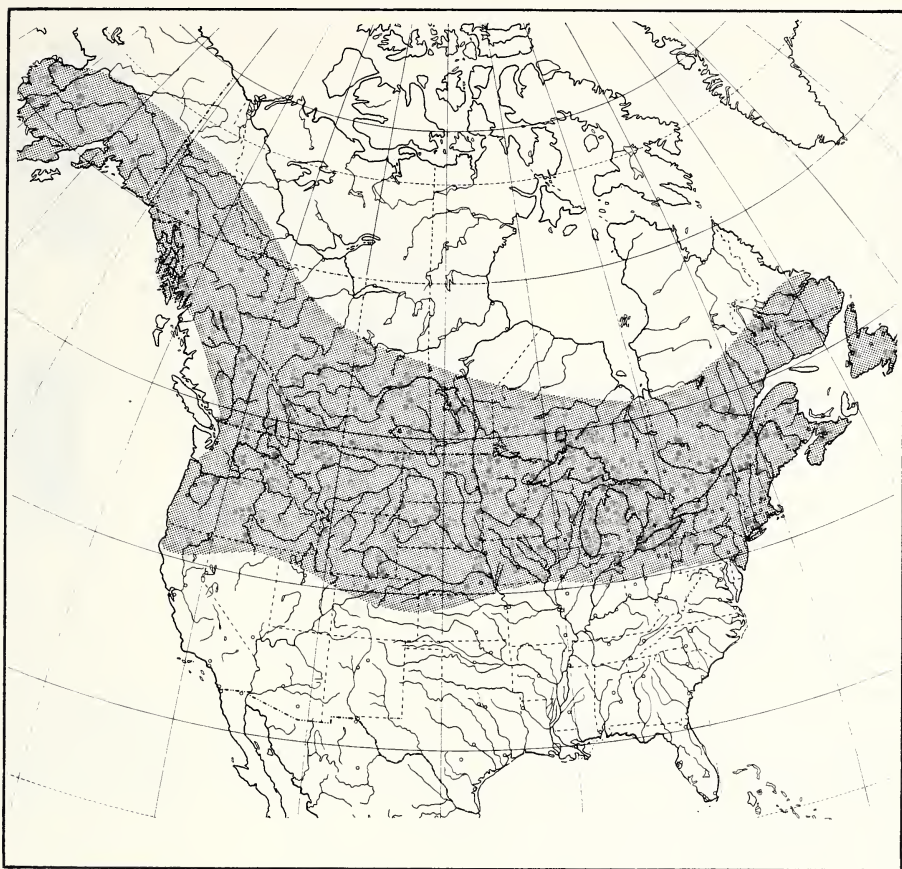


Fig. 561. Distribution. *Anisosticta bitriangularis*.

(Fig. 562f, g); lateral margin of abdomen and meso- and metepimeron black or at least partially darkened. Male genitalia as in Figure 562a–d. Female genitalia as in Figure 562e.

Bielawski (1958) and Iablokoff-Khnzorian (1982) regard *A. borealis* as a junior synonym of *A. strigata* (Thunberg). Brown and de Ruette (1962) maintained *A. borealis* as a valid species. *Anisosticta borealis* is probably deserving of at least subspecific standing because the differences in size and dorsal coloration between it and *A. strigata* are at least as significant as those found in similar situations in the genera *Coccinella* and *Hippodamia*, and differences in distribution of the same nature have been accepted also.

Type locality. Nulato, Alaska.

Type depository. USNM.

Distribution. Figure 563. Manitoba to Alaska.

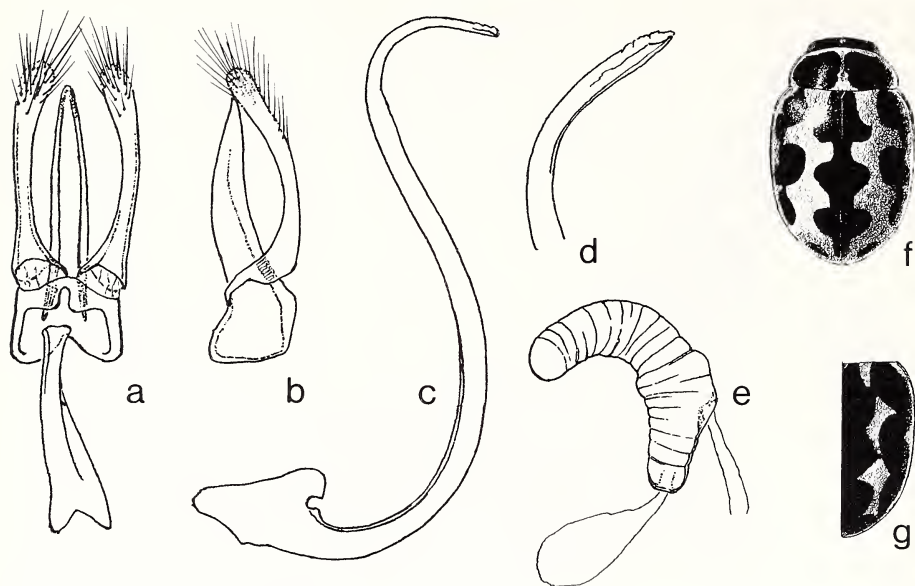


Fig. 562. *Anisosticta borealis*.

Genus *Macronaemia* Casey

Macronaemia Casey, 1899, pp. 75, 76.—Leng, 1903a, p. 37.—Casey, 1908, p. 394.—Timberlake, 1943, p. 45.—Wingo, 1952, p. 22.—Brown and de Ruette, 1962, p. 646.—Belicek, 1976, p. 349.—Iablokoff-Khnzorian, 1982, p. 120. Type-species; *Coccinella episcopalis* Kirby, by monotypy.
Micronaemia Weise, 1905, p. 218.—Casey, 1908, p. 394.

Coccinellini with length 3.25 to 4.0 mm; form extremely elongate, parallel sided, dorsoventrally flattened, femur visible beyond lateral margin of elytron. Dorsal color pattern yellow with black vittae (Fig. 565f). Anterior margin of clypeus nearly truncate, anterolateral angle produced forward. Lateral margin of elytron narrowly, abruptly explanate; epipleuron sloping downward internally, entirely visible when viewed laterally. Intercoxal process of prosternum narrow, strongly convex, lacking carinae but with fine lateral ridge. Apical margin of mesosternum narrowly produced forward between anterior coxae. Apex of middle and hind tibiae each with 2 spurs. Tarsal claw widened basally, not toothed (Fig. 564a). Postcoxal line narrowly incomplete as in *Anisosticta* (Fig. 564b). Male genitalia symmetrical. Female genitalia lacking infundibulum; coxal plate elongate, with strong apical stylus (Fig. 565e).

Paranaemia and *Macronaemia* are the only genera of North American Coccinellini with a distinctly vittate dorsum. *Macronaemia* is much smaller than *Paranaemia*, and the pronotal base is not margined. *Macronaemia* is monobasic in North America but 2 other species have been described from China.

Macronaemia episcopalis is said to be an aphid predator, but I have not seen any specific host data.

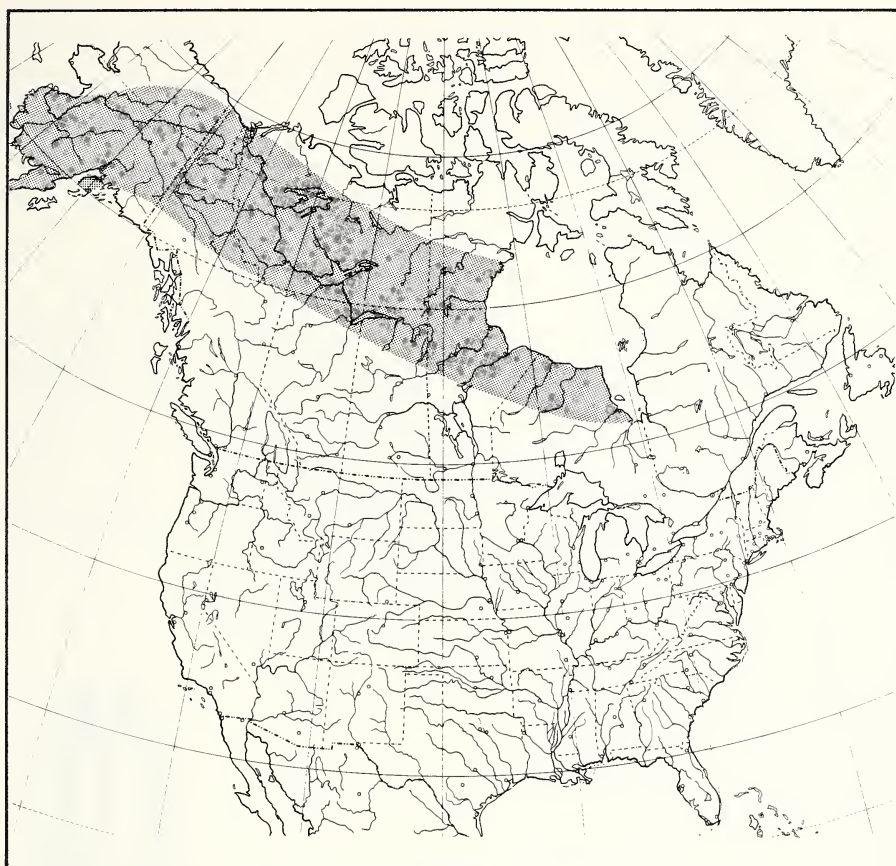


Fig. 563. Distribution. *Anisosticta borealis*.

Macronaemia episcopalis (Kirby)

Fig. 565a–f; Map, Fig. 566

Coccinella episcopalis Kirby, 1837, pp. 228.

Naemia episcopalis: Mulsant, 1850, p. 34.—Mulsant, 1866, p. 24.—Crotch, 1874b, p. 93.—Wickham, 1894, p. 300.

Anisosticta episcopalis: Crotch, 1873, p. 369.—Leng, 1903a, p. 37.

Macronaemia episcopalis: Casey, 1899, p. 76.—Timberlake, 1943, p. 10.—Wingo, 1952, p. 45.—Brown and de Ruette, 1962, p. 646.—Belicek, 1976, p. 349.—Iablokoff-Khnzorian, 1982, p. 121.

Micronaemia episcopalis: Weise, 1905, p. 217.

Diagnosis. Length 3.25 to 4.0 mm, width 1.60 to 2.0 mm. Color yellow with head black except frons and clypeus yellow; 3 black vittae on elytron, sutural vitta narrow; pronotum with 3 black spots on each side, spots often confluent (Fig. 565f); ventral

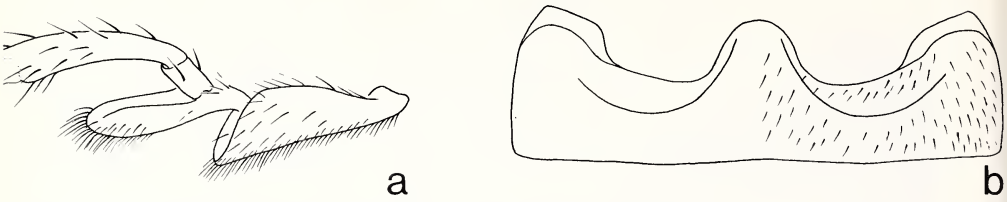


Fig. 564. *Macronaemia episcopalis*. a. Tarsus. b. Postcoxal lines.

surface except leg mostly black except meso- and metepimeron, lateral and apical margins of abdomen yellow; male with prosternum, anterior coxa, and median area of mesosternum yellow. Male genitalia as in Figure 565a–d. Female genitalia as in Figure 565e.

Type locality. “Journey from New York to Cumberland-house”.

Type depository. BMNH (not examined).

Distribution. Figure 566. Ontario to New York, west to Yukon Territory and northern California.

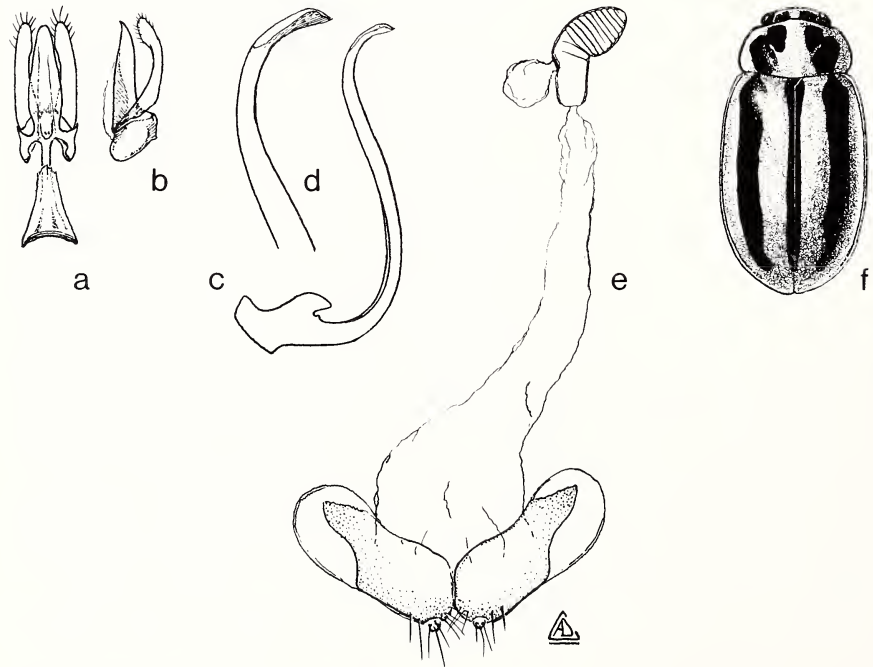


Fig. 565. *Macronaemia episcopalis*.

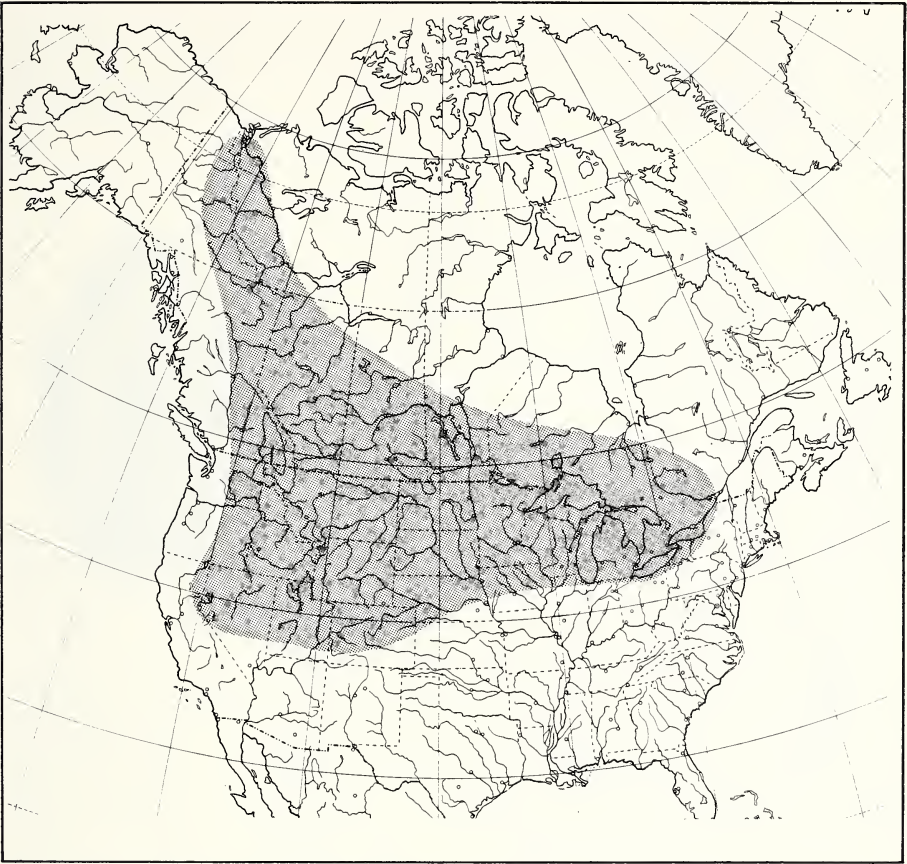


Fig. 566. Distribution. *Macronaemia episcopalis*.

Genus *Paranaemia* Casey

Paranaemia Casey, 1899, p. 76.—Leng, 1903a, p. 38.—Dobzhansky, 1926b, p. 201.—Timberlake, 1943, p. 45.—Hatch, 1961, p. 165.—Brown and de Ruelle, 1962, p. 644. Type-species; *Hippodamia vittigera* Mannerheim, by original designation. *Ceratomegilla* (*Paranaemia*): Leng, 1920, p. 215.—Korschefsky, 1932, p. 312.

Coccinellini with length 4.50 to 6.60 mm. Form elongate, dorsoventrally flattened, femur visible beyond lateral margin of elytron. Dorsal color yellow with black vittae (Fig. 567g). Apex of clypeus truncate, anterolateral angle produced forward. Base of pronotum finely margined. Lateral margin of elytron feebly reflexed; epipleuron nearly flat, sloping downward slightly internally. Intercoxal process of prosternum narrow, feebly convex, lacking carinae but with fine lateral ridge. Apical margin of mesosternum weakly emarginate, ridged. Metasternum lacking postcoxal line. Apex of middle and hind tibiae each with 2 spurs. Tarsal claw widened basally, not toothed

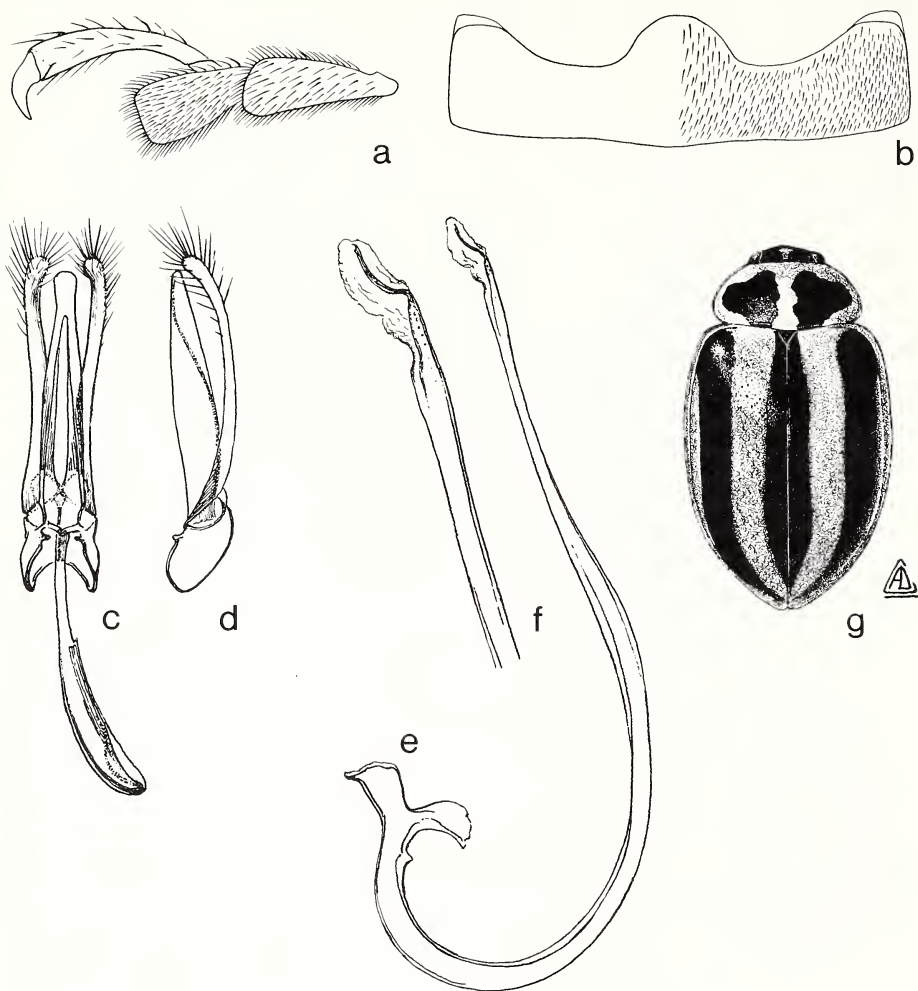


Fig. 567. *Paranaemia vittigera*.

(Fig. 567a). Postcoxal line on abdomen lacking (Fig. 567b). Male genitalia symmetrical. Female genitalia with small infundibulum; coxal plate elongate, stylus distinct (Fig. 568).

Paranaemia may be confused with some vittate specimens of *Hippodamia*, but the pronotal base is margined and the claws are not apically cleft in *Paranaemia* (see comparative remarks under *Macronaemia*). *Paranaemia* is monobasic. *Paranaemia vittigera* is said to be an aphid predator, but I have not seen any specific host data.

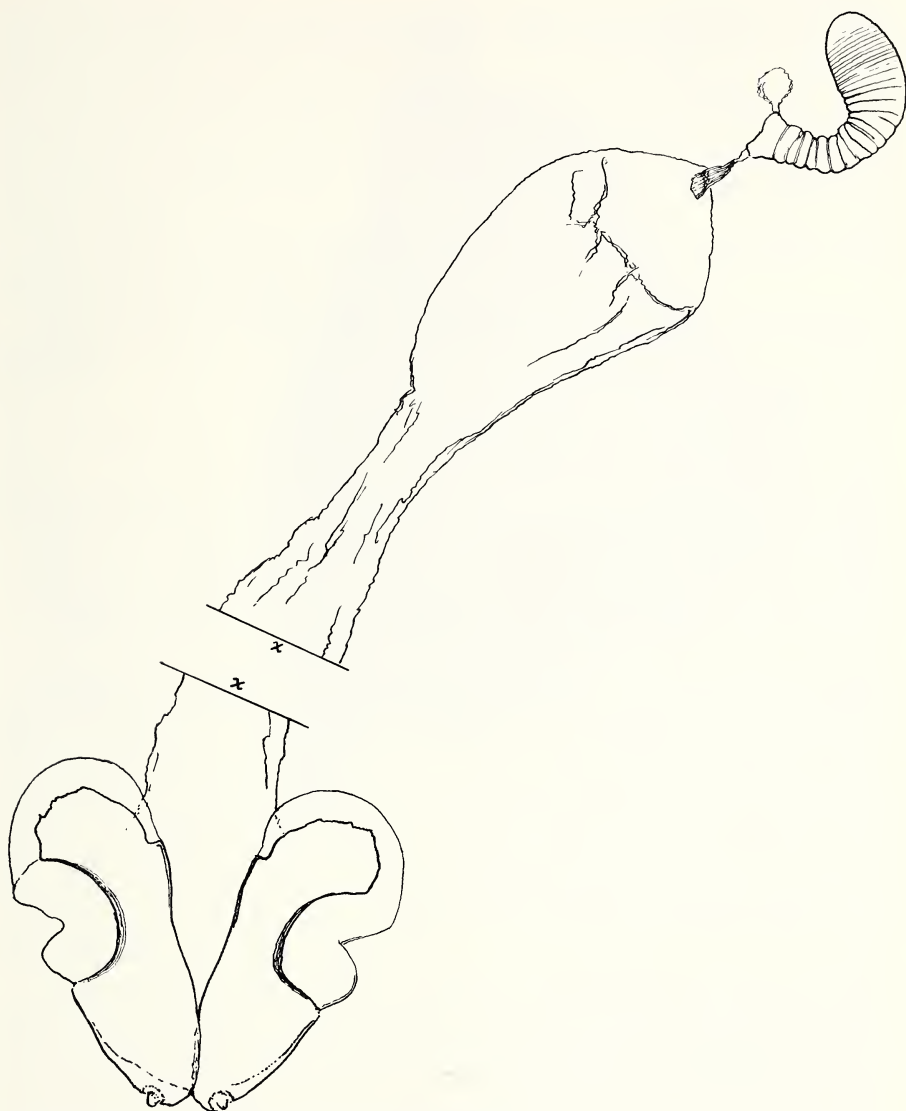


Fig. 568. *Paranaemia vittigera* (female genitalia).

Paranaemia vittigera (Mannerheim)

Fig. 567a–g, 568; Map, Fig. 569

Hippodamia vittigera Mannerheim, 1843, p. 312.

Coccinella (*Hippodamia*) *vittigera*: Guérin, 1844, p. 322.

Naemia vittigera: Mulsant, 1850, p. 33.—Mulsant, 1866, p. 23.—Crotch, 1874b, p. 93.—Chapuis, 1876, p. 171.—Gorham, 1891, p. 153.

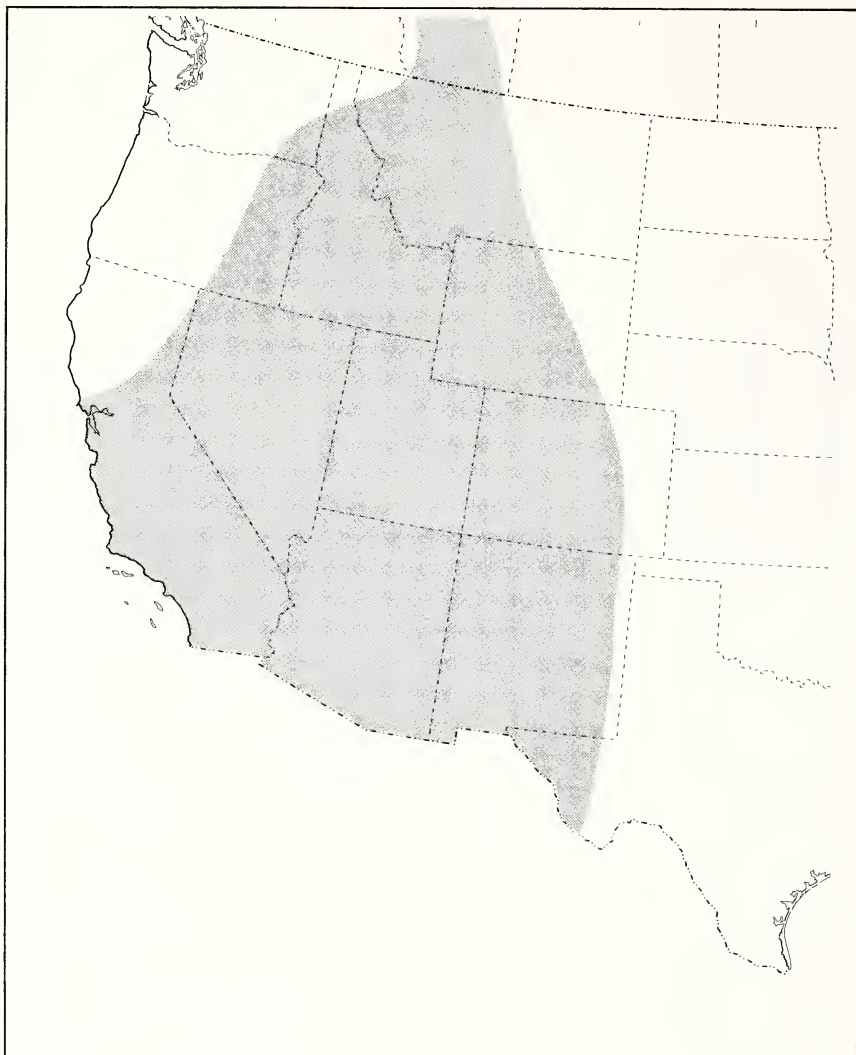


Fig. 569. Distribution. *Paranaemia vittigera*.

Megilla vittigera: Crotch, 1873, p. 364.

Paranaemia vittigera: Casey, 1899, p. 76.—Leng, 1903a, p. 38.—Timberlake, 1943, p. 9.—Hatch, 1961, p. 166.

Ceratomegilla (Paranaemia) vittigera: Korschefsky, 1932, p. 315.

Paranemia similis Casey, 1899, p. 76.—Leng, 1903a, p. 39.—Timberlake, 1943, p. 9.

Ceratomegilla (Paranaemia) vittigera ab. *similis*: Korschefsky, 1932, p. 315.

Diagnosis. Length 4.50 to 6.60 mm, width 2.90 to 3.40 mm. Color yellow with head black except narrow yellow area on frons; 3 black vittae on elytron, sutural

vitta wide; pronotum with large, black lateral spot (Fig. 567g); ventral surface including legs black except prosternum yellow. Male genitalia as in Figure 567c-f. Female genitalia as in Figure 568.

Discussion. There are 6 types of *vittigera* in Helsinki. One of these, a male labeled "Cygnaeus/Calif.bor./coll. Mannerh.", I here designate and label as the lectotype, the remainder as paralectotypes. There are 5 types of *P. similis* in the Casey collection; I here designate and label the first of these, a female as the lectotype and the remainder as paralectotypes.

Type locality. Of *vittigera*, California (lectotype here designated); of *similis*, Arizona (lectotype here designated).

Type depository. Of *vittigera*, UMZH; of *similis*, USNM (35491).

Distribution. Figure 569. Alberta to west Texas, west to British Colombia and California.

Genus *Naemia* Mulsant

Naemia Mulsant, 1850, p. 30.—Mulsant, 1866, p. 21.—Crotch, 1874b, p. 92.—Chapuis, 1876, p. 170.—Gorham, 1891, p. 152.—Wickham, 1894, p. 300.—Casey, 1899, p. 76.—Dobzhansky, 1926b, p. 201.—Mader, 1929, p. 90.—Korschevsky, 1932, p. 317.—Timberlake, 1943, pp. 9, 45.—Brown and de Ruelle, 1962, p. 644.—J. Chapin, 1974, p. 56.—Iablokoff-Khnzorian, 1982, p. 126. Type-species; *Coccinella seriata* Melsheimer, by subsequent designation of Crotch, 1874.

Coccinellini with length 4.0 to 6.70 mm. Form elongate, somewhat flattened, femur visible beyond lateral margin of elytron. Dorsal color yellow with strong, variable, black maculae. Apex of clypeal margin broadly emarginate, anterolateral angle produced forward. Base of pronotum finely margined. Lateral margin of elytron broadly, feebly reflexed; epipleuron nearly flat, sloping downward slightly internally. Intercoxal process of prosternum narrow, feebly convex, lacking carinae but with fine lateral ridge. Metasternum with postcoxal line. Middle and hind tibia each with 2 spurs. Tarsal claw widened basally, not toothed (Fig. 570a). Postcoxal line on abdomen lacking. Male genitalia symmetrical. Female genitalia with small infundibulum; coxal plate elongate, stylus distinct (Fig. 570f).

Naemia is easily confused with *Coleomegilla* because the dorsal color patterns are very similar, but the tarsal claw is toothed and the metasternum lacks postcoxal lines in *Ceratomegilla*. *Naemia* is an American genus ranging from southern New England and southwestern United States to the Antilles and Central America. The distribution is mainly coastal or insular, possibly because of a high humidity requirement. There have been 3 names proposed within the genus, and I consider one of these a synonym and 2 valid subspecies. Members of *Naemia* are said to be aphid predators, but I have not seen any specific host data.

KEY TO SUBSPECIES OF *Naemia seriata* (MELSHEIMER)

1. Head usually entirely black; surface of elytron not strongly alutaceous; eastern and southern United States, Antilles *seriata seriata* Melsheimer
- Head with clypeus and triangular median area on frons pale; surface of elytron strongly alutaceous; southern California *seriata litigiosa* Mulsant

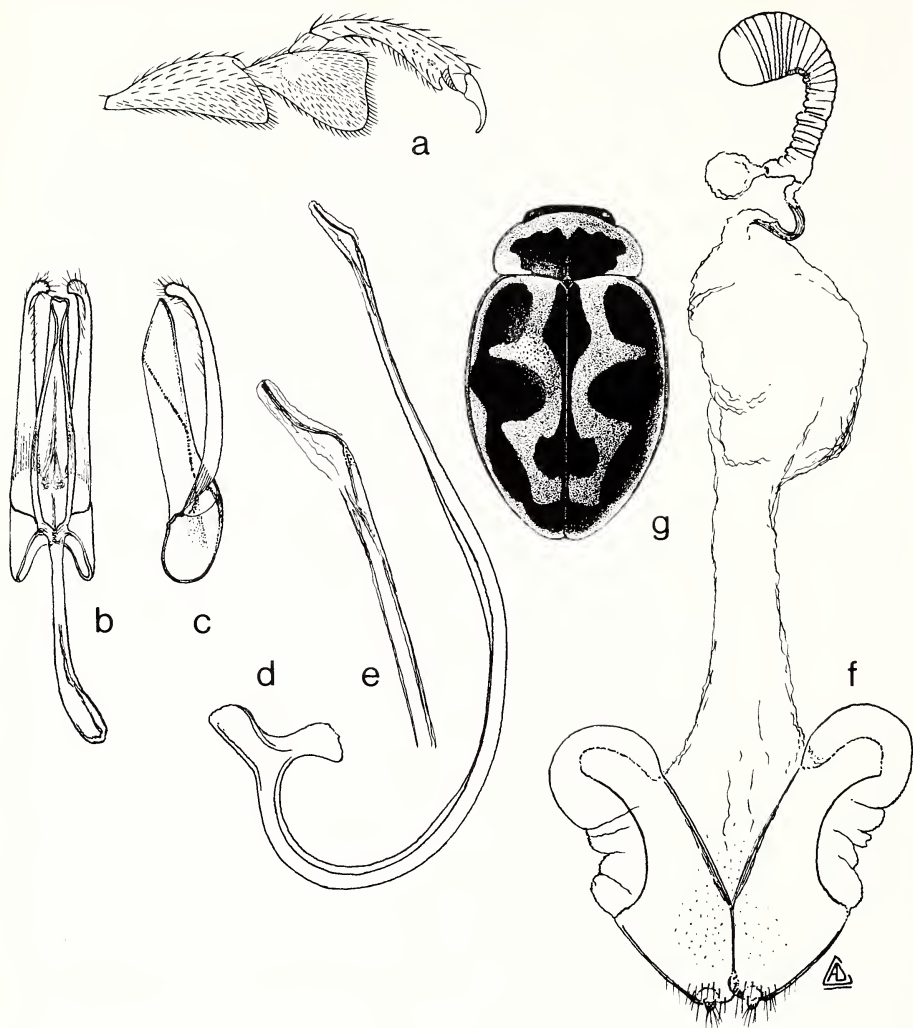


Fig. 570. *Naemia seriata seriata*.

Naemia seriata seriata (Melsheimer)

Fig. 570a-g; Map, Fig. 571

Coccinella seriata Melsheimer, 1847, p. 177.

Anisosticta seriata: LeConte, 1852, p. 130.—Crotch, 1873, p. 369.—Leng, 1903a, p. 37.

Naemia seriata: Mulsant, 1866, p. 21.—Crotch, 1874b, p. 92.—Gorham, 1891, p. 152.—Casey, 1899, p. 76.—Korschefsky, 1932, p. 317.—Timberlake, 1943, p. 9.

Naemia seriata seriata: Timberlake, 1943, p. 46.

Megilla fuscilabris decepta Blatchley, 1914, p. 64. **New Synonymy.**



Fig. 571. Distribution. *Naemia seriata seriata* (shaded); *N. s. litigiosa* (star).

Ceratomegilla fuscilabris a. *decepta*: Leng, 1920, p. 215.

Ceratomegilla maculata ab. *decepta*: Korschefsky, 1932, p. 313.

Naemia seriata decepta: Timberlake, 1943, pp. 9, 46.—J. Chapin, 1976, p. 56.

Diagnosis. Length 4.0 to 6.70 mm, width 2.50 to 3.10 mm. Head black; pronotum typically yellow with an irregular, black, central macula (Fig. 570g), but many southern specimens have macula broken into ill-defined spots; elytron yellow with 6 black spots more or less fused in northern specimens (typical form). Ventral surface including leg black except prosternum and lateral abdominal margin yellow. Male genitalia as in Figure 570b–e. Female genitalia as in Figure 570f.

Discussion. *Naemia decepta* is a color form of *N. seriata* occurring mainly in Florida and along the Gulf Coast, also in the Antilles. The *N. decepta* color type occurs in occasional specimens as far north as Maryland; there are no genitalic differences between *N. decepta* and *N. seriata* and numerous specimens cannot be assigned to either *N. seriata* or *N. decepta*; therefore I consider *decepta* a junior synonym.

Type locality. Of *seriata*, Pennsylvania; of *decepta*, Ormond, Florida.

Type depository. Of *seriata*, not known; of *decepta*, PU.

Distribution. Figure 571. Atlantic and Gulf coasts, Rhode Island to south Texas.

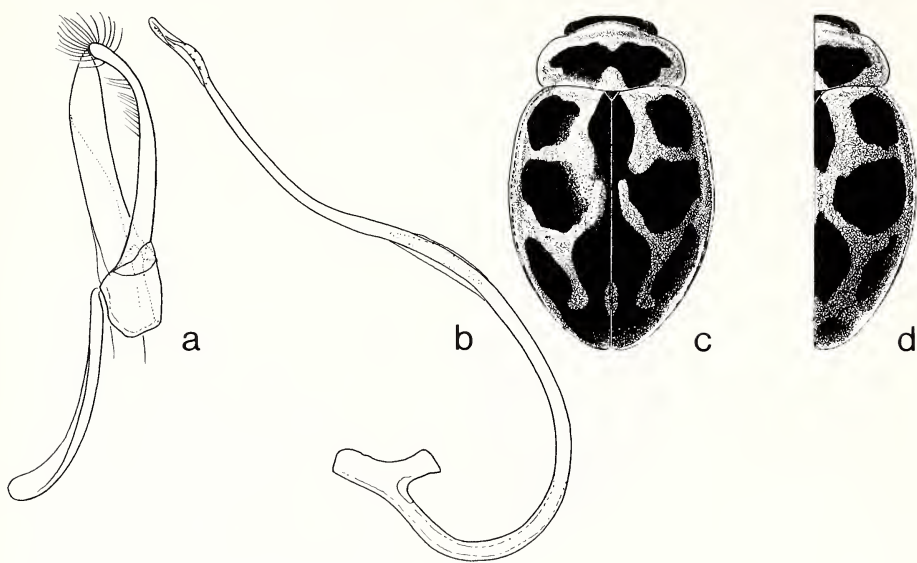


Fig. 572. *Naemia seriata litigiosa*.

Naemia seriata litigiosa Mulsant
Fig. 572a-c; Map, Fig. 571

Naemia litigiosa Mulsant, 1850, p. 31.—Mulsant, 1853, p. 22.—Crotch, 1874b, p. 92.

Anisosticta litigiosa: Crotch, 1873, p. 369.—Leng, 1903a, p. 37.

Naemia seriata litigiosa: Leng, 1920, p. 215.—Korschefsky, 1932, p. 317.

Description as for *seriata*, s. str., except clypeus and triangular area on frons pale, spots on elytron not particularly confluent (Fig. 572c, d); surface of elytron strongly alutaceous and densely punctured; male genitalia with basal lobe curved in lateral view, siphos sinuate (Fig. 572a, b).

The southwestern United States populations of *seriata* are apparently widely disjunct, unless there are Mexican populations connecting them with the eastern form. The California specimens are separable on both male genitalia and external appearance, therefore I elect to apply the name *litigiosa* Mulsant, long considered a junior synonym of *seriata*. The question seems to be whether or not to consider *litigiosa* a valid species rather than a subspecies, but I prefer to follow the more conservative course at present.

Type locality. "l'Amerique du nord".

Type depository. DLM (type not examined).

Distribution. Figure 571. CALIFORNIA: San Diego. NEW MEXICO: La Cuera, Organ Mts.

Genus *Coleomegilla* Timberlake

Coleomegilla Timberlake, 1920a, p. 139.—Timberlake, 1920b, p. 96.—Timberlake, 1943, pp. 9, 46.—Wingo, 1952, p. 23.—Brown and de Ruelle, 1962, p. 646.—J.

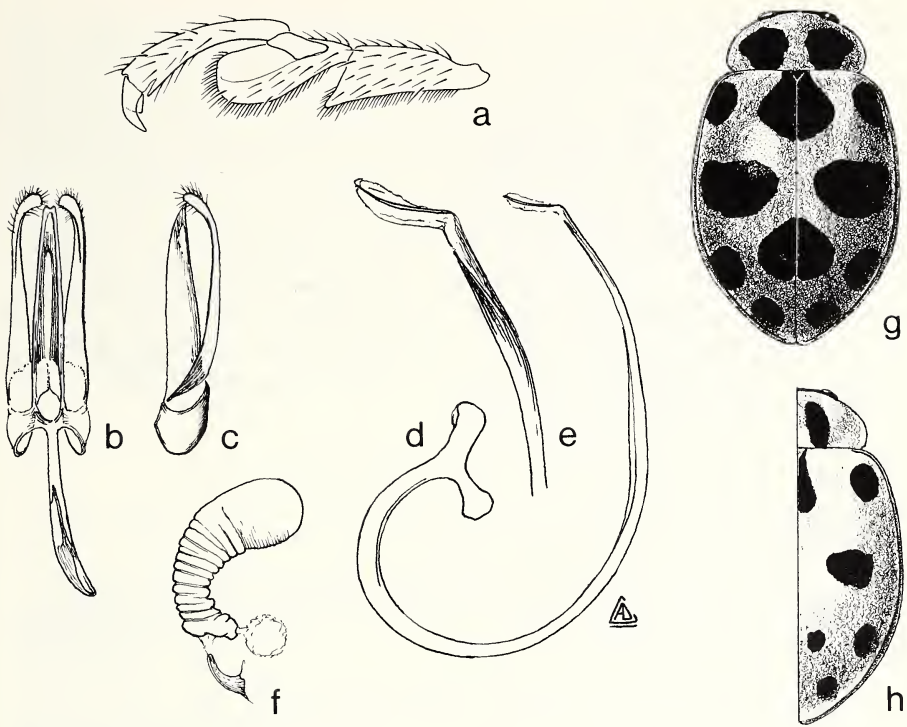


Fig. 573. *Coleomegilla maculata lengi*.

Chapin, 1974, p. 57. Type-species; *Coccinella maculata* Degeer, by original designation.

Megilla Mulsant, 1850, p. 24. (not *Megilla* F., 1805, nor *Megilla* Erichson, 1849).—Mulsant, 1866, p. 16.—LeConte, 1852, p. 130.—Crotch, 1873, p. 364.—Crotch, 1874b, p. 92.—Chapuis, 1876, p. 169.—Gorham, 1891, p. 151.—Wickham, 1894, p. 300.—Casey, 1899, p. 76.—Leng, 1903a, p. 38.—Blatchley, 1910, p. 510.—Dobzhansky, 1926b, p. 201.—Korschefsky, 1932, p. 312. Type-species; *Coccinella maculata* Degeer, by subsequent designation of Crotch, 1873.

Coccinellini with length 4.0 to 8.0 mm. Form elongate, somewhat dorsoventrally flattened, femur visible beyond lateral margin of elytron. Dorsal color red or yellowish orange with black maculae (Fig. 573g). Apex of clypeus broadly, feebly emarginate, anterolateral angle produced forward. Base of pronotum finely margined. Lateral margin of elytron broadly, feebly reflexed; epipleuron nearly flat, sloping downward slightly internally. Intercostal process of prosternum narrow, feebly convex, lacking carinae but with fine lateral ridge. Apical margin of mesosternum triangularly notched medially, ridged. Metasternum lacking postcoxal line. Apex of middle and hind tibiae each with 2 spurs. Tarsal claw with subquadrate basal tooth (Fig. 573a). Postcoxal line on abdomen lacking. Male genitalia symmetrical. Female genitalia with small infundibulum (Fig. 573f); coxal plate elongate, stylus distinct.

Coleomegilla and *Naemia* are very similar in appearance (see remarks under *Naemia*) but quite distinct from each other in claw structure. *Coleomegilla* is an American genus ranging from southern Canada to Georgia and southern California, south to Venezuela and Peru. There are currently about 15 names in use within the genus as species, subspecies, or varieties. Of these names, 3 have been listed as subspecies of *C. maculata* from America north of Mexico (Timberlake, 1943). Members of this genus are usually considered to be primarily aphid predators, but Forbes (1883) found that more than 50% of the diet of *C. maculata lengi* was composed of pollen from various plants. The bulk of the animal portion of the diet was composed of aphids. Specific aphid and adelgid hosts are as follows: *Acyrtosiphon dirhodum* (Walker), *Acyrtosiphon pisum* (Harris), *Aphis gossypii* Glover, *Aphis rumicis* L., *Brevicoryne brassicae* (L.), *Hyadaphis erysimi* (Kaltenbach), *Macrosiphum avenae* (F.), *Macrosiphum euphorbiae* (Thomas), *Nearctaphis crataegifoliae* (Fitch), *Pemphigus bursarius* (L.), *Pineus strobi* (Hartig).

KEY TO SUBSPECIES OF *Coleomegilla maculata* (DEGEER)

1. Pronotal spots large, triangular; median elytral spot large, oval, spot on apical declivity touching sutural margin (Fig. 573g) 2
- Pronotal spots small, reduced, oval or curvilinear; median elytral spot reduced or divided into a small lateral spot and a large median spot; spot at apical declivity not touching sutural margin (Fig. 576f) *maculata fuscilabris* (Mulsant)
- 2(1). Basal lobe of male genitalia with apex feebly notched (Fig. 573g) *maculata lengi* Timberlake
- Basal lobe of male genitalia with apex distinctly notched (Fig. 575a) *maculata strenua* (Casey)

Coleomegilla maculata lengi Timberlake

Fig. 573a-h; Map, Fig. 574

Chrysomela 10-maculata F., 1781, p. 98.

Megilla maculata: Mulsant, 1850, p. 28.—Mulsant, 1866, p. 20.—Crotch, 1873, p. 364.—Crotch, 1874b, p. 92.—Gorham, 1891, p. 151.—Wickham, 1894, p. 300.—Leng, 1903a, p. 38.—Blatchley, 1910, p. 510.

Hippodamia maculata: LeConte, 1852, p. 131.—Forbes, 1883, p. 51.

Ceratomegilla maculata: Leng, 1920, p. 215.—Korschefsky, 1932, p. 312.

Coleomegilla maculata lengi Timberlake, 1943, p. 9.—Wingo, 1952, p. 45.—Brown and de Ruette, 1962, p. 646.—J. Chapin, 1974, p. 57.

Megilla fuscilabris: (of authors, not Mulsant, 1866).—Casey, 1899, p. 76.—Leng, 1903a, p. 38.—Blatchley, 1914, p. 64.

Diagnosis. Length 4.20 to 6.60 mm, width 2.80 to 3.80 mm. Head black with triangular pale area on frons; pronotum yellow with triangular black macula on each side; elytron pink to red with 6 black maculae (Fig. 573g, h). Ventral surface including legs black except prosternum and lateral abdominal margin yellow. Male genitalia as in Figure 573b-e. Female genitalia as in Figure 573f.

Discussion. Prior to Timberlake (1943), the names and combinations thereof relating to *C. maculata* were greatly confused in the literature. Thanks to his work they can now be sorted out in a reasonable fashion although at least a few of the names

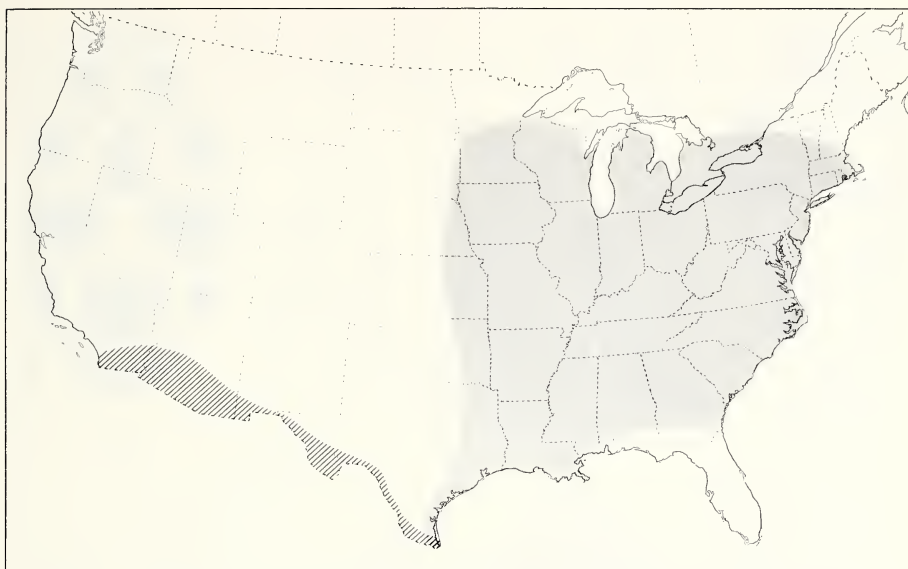


Fig. 574. Distribution. *Coleomegilla maculata lengi* (shaded, eastern); *C. m. strenua* (shaded, southwest).

currently in use will surely prove to be synonyms. As pointed out by Timberlake, the name *C. fuscilabris* (Mulsant) was incorrectly applied to this subspecies by most authors subsequent to Mulsant's original description. Timberlake (1943) said that subspecies *lengi* was generally distributed east of the Rocky Mountains, referring western specimens to the subspecies *strenua*. I follow this course here, but with some reservations about the necessity of maintaining 2 names. If it becomes apparent that *strenua* and *lengi* are synonymous, *strenua* will have priority.

Type locality. Columbus, Ohio.

Type depository. Type not examined.

Distribution. Figure 574. Ontario to Georgia, west to Minnesota and Texas.

Coleomegilla maculata strenua (Casey)

Fig. 575a–d; Map, Fig. 574

Megilla strenua Casey, 1899, p. 76.

Megilla maculata var. *strenua*: Leng, 1903a, p. 38.

Ceratomegilla maculata ab. *strenua*: Korschevsky, 1932, p. 313.

Coleomegilla maculata strenua: Timberlake, 1943, p. 46.

Diagnosis. Length 6.40 to 7.0 mm, width 3.40 to 4.30 mm. Description as for *lengi* (Fig. 575f) except male genitalia as in Figure 575a–d. Female genitalia as in Figure 575e.

Discussion. This subspecies is noticeably larger than *C. m. lengi* on the average, but the only other difference I can find is in the shape of the apex of the basal lobe

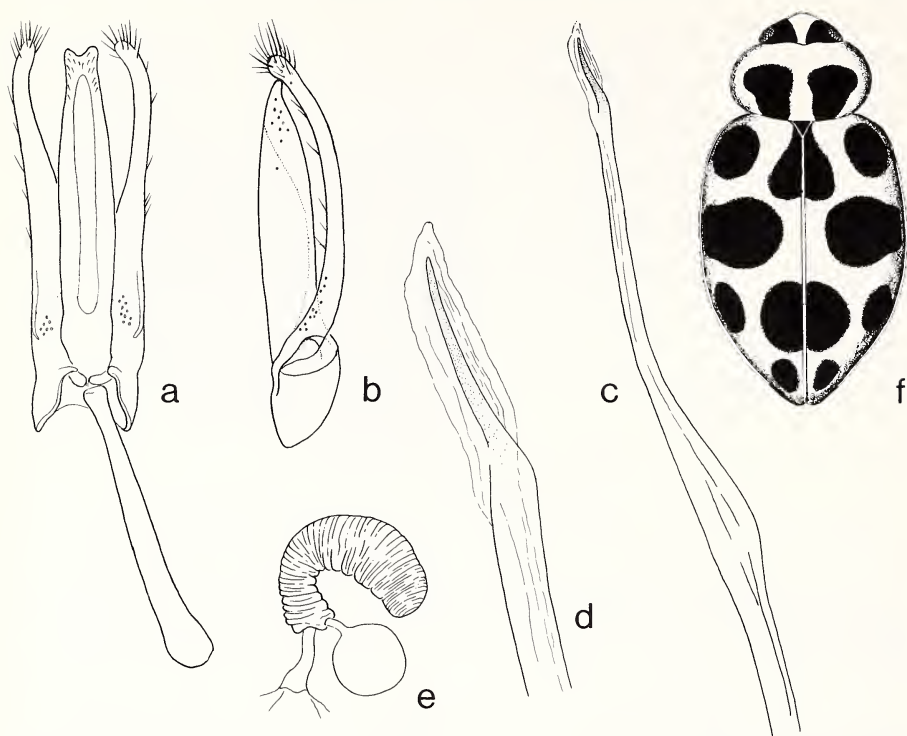


Fig. 575. *Coleomegilla maculata strenua*.

of the male genitalia. There are 5 types of *C. m. strenua* in the Casey collection, the first of which (female) I here designated and label as the lectotype, the remainder as paralectotypes.

Type locality. Brownsville, Texas (lectotype here designated).

Type depository. USNM (35493).

Distribution. Figure 574. Texas to southern California.

Coleomegilla maculata fuscilabris (Mulsant)

Fig. 576a-f; Map, Fig. 577

Naemia fuscilabris Mulsant, 1866, p. 22.

Megilla fuscilabris: Crotch, 1873, p. 364 (in part); Gorham, 1891, p. 152.

Ceratomegilla maculata ab. *fuscilabris*: Korschefsky, 1932, p. 313.

Coleomegilla maculata fuscilabris: Timberlake, 1943, p. 46.—J. Chapin, 1974, p. 58.

Megilla maculata var. *floridana* Leng, 1903a, p. 38.—Blatchley, 1914, p. 64.—Timberlake, 1943, p. 9.

Ceratomegilla maculata ab. *floridana*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 313.

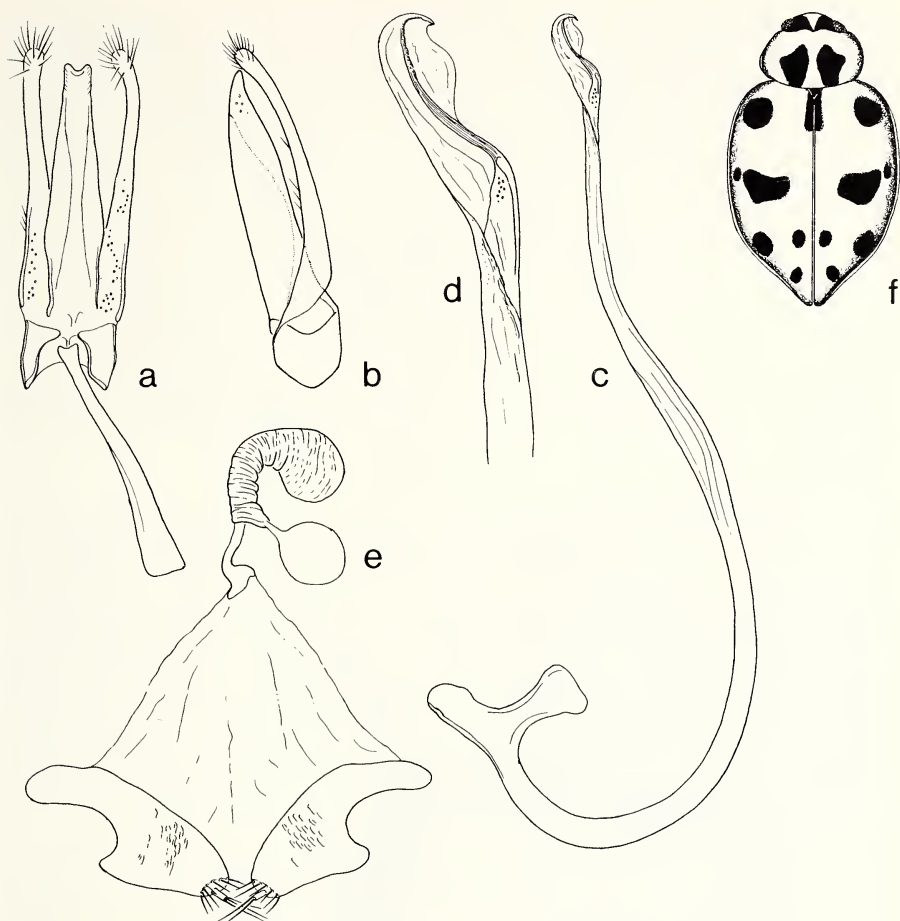


Fig. 576. *Coleomegilla maculata fuscilabris*.

Diagnosis. Length 4.0 to 5.75 mm, width 2.30 to 3.50 mm. Description as for *lengi* except pronotum with black spots reduced, oval or curvilinear; median spot on elytron reduced, usually divided into larger median spot and small sublateral spot (Fig. 576f), lateral spot often lacking. Male genitalia as in Figure 576a–d. Female genitalia as in Figure 576e.

Discussion. The dorsal background color in *C. m. fuscilabris* is usually paler yellow than in the other two subspecies, and is almost never pink or reddish as is often the case with *C. m. lengi* and *C. m. strenua*.

Type locality. Of *fuscilabris*, New Orleans, Louisiana; of *floridana*, Florida and Louisiana.

Type depository. Of *fuscilabris*, type not examined; of *floridana*, type not examined.

Distribution. Figure 577. South Carolina to Florida, west to Louisiana (coastal localities); disjunct locality—Shaw Pond, Washington, D.C.

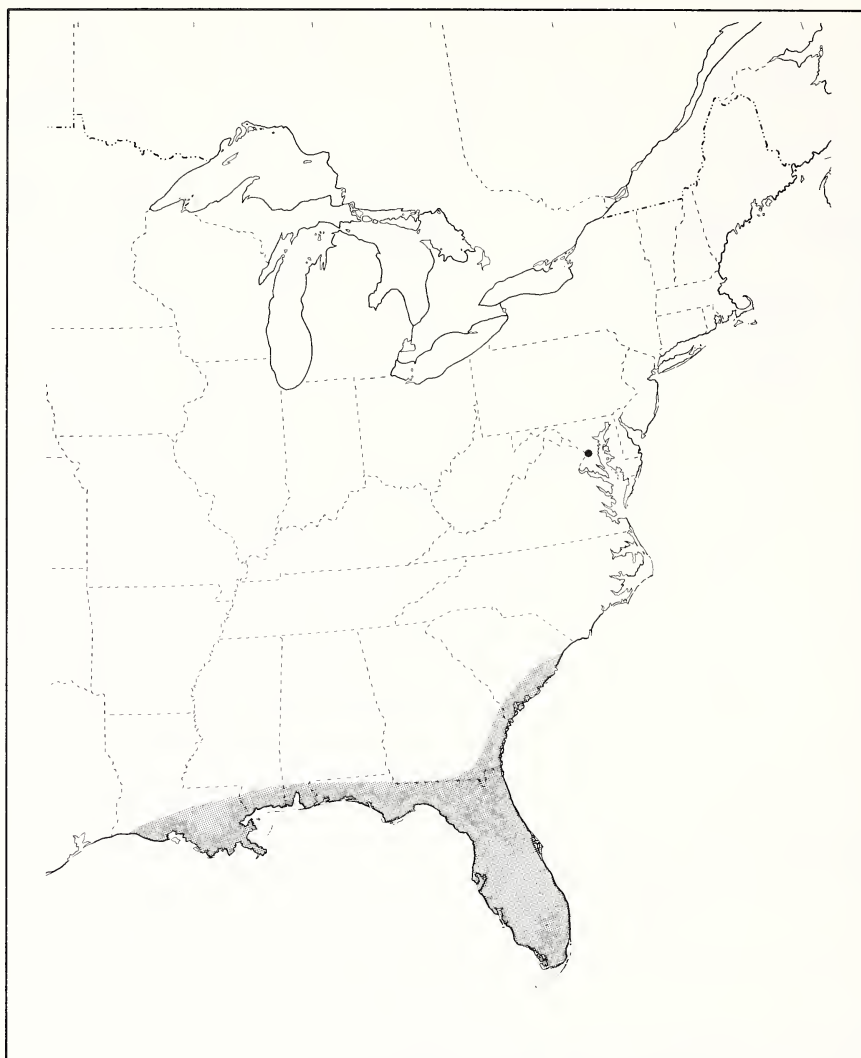


Fig. 577. Distribution. *Coleomegilla maculata fuscilabris* (shaded, disjunct locality dotted).

Genus *Ceratomegilla* Crotch

Ceratomegilla Crotch, 1873, p. 365.—Crotch, 1874b, p. IX.—Casey, 1899, p. 75.—Leng, 1920, p. 215.—Korschefsky, 1932, p. 312.—Scott, 1933, p. 126.—Timberlake, 1943, p. 45.—Brown and de Ruette, 1962, p. 646.—Belicek, 1976, p. 338.

Type-species; *Ceratomegilla ulkei* Crotch, by monotypy.

Spiladelpha Semenov-Tian-Shanskij and Dobzhansky, 1923, p. 99.—Mader, 1929,

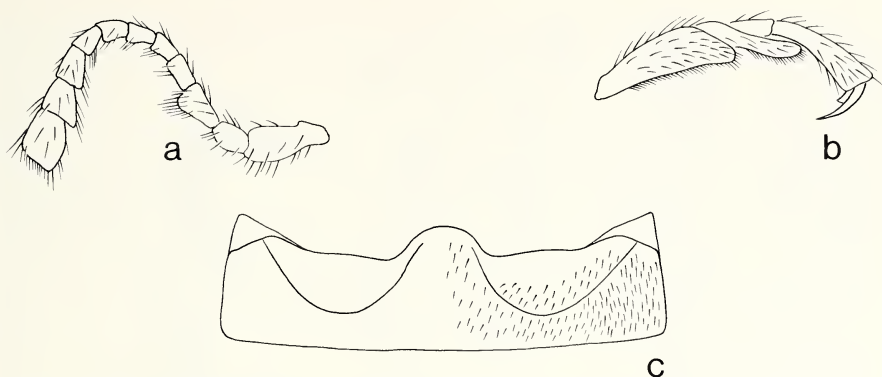


Fig. 578. *Ceratomegilla ulkei*. a. Antenna. b. Tarsus. c. Postcoxal lines.

p. 87.—Brown and de Ruelle, 1962, p. 646. Type-species; *Spiladelpha barovskii* Semenov-Tian-Shanskij and Dobzhansky, by monotypy.
Hippodamia (*Ceratomegilla*) Iablokoff-Khnzorian, 1982, p. 327.

Coccinellini with length 3.70 to 4.70 mm. Form elongate, slender, apex of elytron acute or subacute, not rounded. Apex of clypeus truncate; anterolateral angle without projection. Third antennal segment in male strongly triangular, wider than second or fourth segment, anterior apical angle ciliate (Fig. 578a). Base of pronotum finely margined. Lateral margin of elytron not reflexed; epipleuron sloping downward internally. Intercoxal process of prosternum narrow, feebly convex, lacking carinae but with fine lateral ridge. Apical margin of mesosternum truncate, ridged. Metasternum with postcoxal line, line usually reaching lateral margin. Apex of middle and hind tibiae each with 2 spurs. Anterior tarsus of male with basal 2 segments strongly dilated; of middle tarsus almost as strongly dilated. Tarsal claw with basal tooth, tooth not as wide as long, apex acute (Fig. 578b). Postcoxal line on abdomen distinct, complete, of *Pullus* type (Fig. 578c). Male genitalia symmetrical. Female genitalia with small infundibulum; coxal plate somewhat elongate, stylus distinct (Fig. 579e).

Ceratomegilla has been confused with other genera over the years, mainly because of its rarity in collections. Crotch (1873) included one species, *C. ulkei*, known from arctic and subarctic North America in the genus. Brown and de Ruelle (1962) synonymized *Spiladelpha* with *Ceratomegilla*; *Spiladelpha* contains 3 species from Siberia, Tibet, and Russian Turkestan. Belicek (1976) placed *Ceratomegilla* as a junior synonym of *Hippodamia*, but this placement cannot be maintained because the characters distinguishing *Ceratomegilla* are at least as definitive as those of any other genus in the Coccinellini. Iablokoff-Khnzorian treated *Ceratomegilla* as a subgenus of *Hippodamia*. Some species of *Hippodamia* have the male tarsal segments strongly dilated as in *Ceratomegilla*, but in *Hippodamia* the pronotal base is not margined, and each tarsal claw is cleft at the middle. Members of *Ceratomegilla* are probably aphid predators, but no specific host data is known.

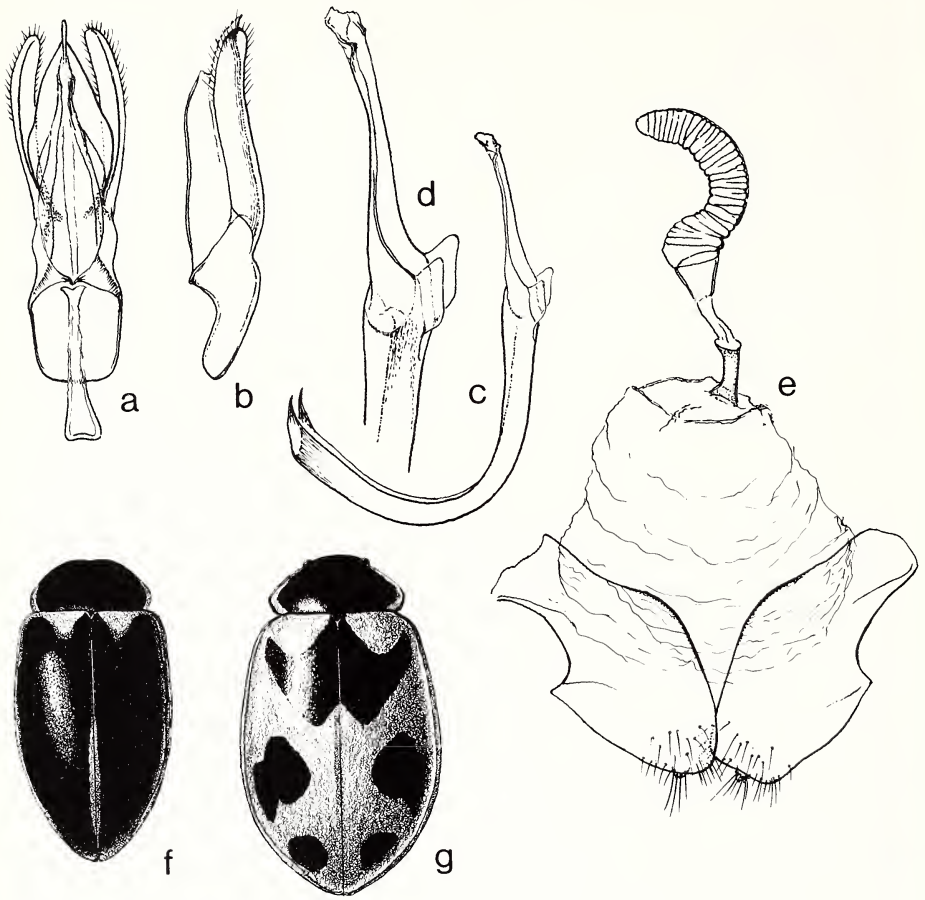


Fig. 579. *Ceratomegilla ulkei*.

Ceratomegilla ulkei Crotch

Fig. 579a-g; Map, Fig. 580

Ceratomegilla ulkei Crotch, 1873, p. 365.—Crotch, 1874b, p. IX.—Wickham, 1894, p. 305.—Casey, 1899, p. 75.—Leng, 1903a, p. 39.—Korschefsky, 1932, p. 315.—Scott, 1933, p. 136.—Brown and de Ruelle, 1962, p. 647.

Hippodamia ulkei: Belicek, 1976, p. 340.

Spiladelphina barovskii Semenov and Dobzhansky, 1923, p. 99.—Iablokoff-Khnzorian, 1982, p. 328.

Hippodamia parva Watson, 1954, p. 45.—Belicek, 1976, p. 340.

Ceratomegilla parva: Brown and de Ruelle, 1962, p. 647.

Hippodamia (Ceratomegilla) ulkei: Iablokoff-Khnzorian, 1982, p. 327.

Diagnosis. Length 3.70 to 4.70 mm. Head black with 2 yellow spots; pronotum black with yellow lateral margin; elytron typically black with pale margins, but pattern



Fig. 580. Distribution. *Ceratomegilla ulkei*.

variable (Fig. 579f, g). Ventral surface including legs black except abdomen reddish brown. Male genitalia as in Figure 579a–d. Female genitalia as in Figure 579e.

Discussion. Brown and de Ruette (1962) indicated the similarity of *C. ulkei* and *H. parva*, and Belicek (1976) synonymized the two names. The only species with which *C. ulkei* is likely to be confused is *Hippodamia arctica* (Schneider), but the generic characters will separate them. Crotch apparently had only one type specimen (holotype) when he described this species.

Type locality. Of *ulkei*, “Hudson’s Bay”, of *parva*, Cape Henrietta Maria, Ontario.

Type depository. Of *ulkei*, type not located; of *parva*, CNC.

Distribution. Figure 580. ALASKA: Cape Thompson, Ogotonuk Cr.; Rampart House, 60–75 mi. North; Sheenjek R.; Umiat. BRITISH COLUMBIA: Summit Lake, mi 379 and 392, Alaska Hwy. NORTH WEST TERRITORIES: Coppermine; Fort McPherson; Muskox Lake; Reindeer Depot; Tuktoyaktuk; Tununuk. ONTARIO: Cape Henrietta Maria. YUKON TERRITORY: Selkirk.

Genus *Hippodamia* Dejean

- Hippodamia* Dejean, 1837, p. 456.—Mulsant, 1846, p. 30.—Mulsant, 1850, p. 10.—Mulsant, 1866, p. 8.—LeConte, 1852, p. 130.—Crotch, 1873, p. 365.—Crotch, 1874b, p. 94.—Chapuis, 1876, p. 168.—Gorham, 1891, p. 106.—Wickham, 1894, p. 298.—Casey, 1899, p. 77.—Leng, 1903a, p. 36.—Blatchley, 1910, p. 511.—Timberlake, 1919, p. 162.—Mader, 1926, p. 17.—Korschefsky, 1932, p. 318.—Timberlake, 1943, p. 45.—Chapin, 1946, p. 2.—Wingo, 1952, p. 22.—Brown and de Ruelle, 1962, p. 648.—J. Chapin, 1974, p. 58.—Belicek, 1976, p. 338. Type-species; *Coccinella tredecimpunctata* L., by subsequent designation of Crotch, 1873.
- Hippodamia* (*Hippodamia*): Iablokoff-Khnzorian, 1982, p. 308.
- Hemisphaerica* Hope, 1840, p. 157.—Mulsant, 1850, p. 16.—Korschefsky, 1932, p. 439.—Belicek, 1976, p. 338. Type-species; *Coccinella quinquesignata* Kirby, by monotypy.
- Adonia* Mulsant, 1846, p. 39.—Mulsant, 1850, p. 36.—Mulsant, 1866, p. 27.—Crotch, 1873, p. 368.—Crotch, 1874b, p. 94.—Mader, 1926, p. 18.—Korschefsky, 1932, p. 345.—Timberlake, 1943, p. 45.—Brown and de Ruelle, 1962, p. 648.—Belicek, 1976, p. 338. Type-species; *Coccinella mutabilis* Scriba, a synonym of *Adonia variegata* (Goeze), by monotypy.
- Hippodamia* (*Adonia*): Iablokoff-Khnzorian, 1982, p. 308.
- Hippodamia* (*Parippidamia*): Iablokoff-Khnzorian, 1979, p. 51.—Iablokoff-Khnzorian, 1982, p. 308. Type-species, *Coccinella arctica* Schneider, by original designation.

Coccinellini with length 3.0 to 8.0 mm. Form elongate, oval, femur visible beyond lateral margin of elytron. Dorsal color usually red with black maculae. Apex of clypeus truncate or feebly concave; anterolateral angle without projection or with slight forward projection. Base of pronotum not margined. Lateral margin of elytron feebly reflexed; epipleuron nearly flat, sloping downward slightly internally. Intercostal process of prosternum narrow, usually feebly convex, lacking carinae but with fine lateral ridge. Mesosternum protuberant medially; with apical fossa for reception of prosternal process. Metasternum with or without postcoxal line. Apex of middle and hind tibiae each with 2 spurs. Each front and middle tarsus of male dilated in some species, unmodified in others. Tarsal claw cleft (Fig. 587i). Postcoxal line on abdomen present, or absent. Male genitalia symmetrical. Female genitalia with large infundibulum; coxal plate elongate, stylus distinct (Fig. 595e).

Species of *Hippodamia* are superficially similar to members of several other coccinelline genera, but the cleft tarsal claws are unique to members of *Hippodamia*. *Hippodamia* is mostly nearctic and palearctic in distribution with 9 species either restricted to the Palearctic Region, or are holarctic. I recognize 25 names as valid in America north of Mexico, and one species, *H. koebelei* Timberlake, is known only from Mexico. The genus was revised by Chapin (1946) and I have essentially followed his classification except for the elimination of a few subspecific names and the addition of a key to species. I have attempted to construct a key based on external characters, but with limited success. Male genitalia or female still must be examined in many instances because I have not been able to find external characters to distinguish some species. Chapin (1946) divided the American species into 4 groups based on the

structure of the male genitalia and, in part, the presence or absence of denticles in the female bursa. Chapin also included illustrations of almost all the dorsal color variations of species of *Hippodamia*; and his paper should be consulted for these because I have included only illustrations of the basic patterns. Brown and de Ruelle (1962) compared the genera *Hippodamia* and *Adonia* but did not synonymize the 2 names. Belicek (1976) placed *Adonia* as a junior synonym of *Hippodamia* and I follow this course here. Iablokoff-Khnzorian treated *Adonia* as a subgenus of *Hippodamia*.

Animal food of members of *Hippodamia* consists of aphids, with specific host records as follows; *Acyrtosiphon dirhodum* (Walker), *Acyrtosiphon pisum* (Harris), *Aphis forbesi* Weed, *Aphis gossypii* Glover, *Aphis nerii* Boyer de Fonscolombe, *Aphis pomi* Degeer, *Aphis rumicis* L., *Aphis viburni* Scopoli, *Brevicoryne brassicae* (L.), *Chromaphis juglandicola* (Kaltenbach), *Capitophorus eleagni* (del Guercio), *Eriosoma lanigerum* (Hausman), *Hyadaphis erysimi* (Kaltenbach), *Macrosiphum avenae* (F.), *Macrosiphum euphorbiae* (Thomas), *Macrosiphum rosae* (L.), *Monellia caryella* (Fitch), *Monelliopsis californica* (Essig), *Monelliopsis caryae* (Monell), *Myzus cerasi* (F.), *Myzus persicae* (Sulzer), *Nearctaphis bakeri* (Cowen), *Nearctaphis crataegifoliae* (Fitch), *Periphyllus negundinis* (Thomas), *Phorodon humuli* (Schränk), *Rhopalosiphum* (Fitch), *Schizaphis graminum* (Rondani).

KEY TO SPECIES OF *Hippodamia*

1. Mesepimeron black (occasionally bicolored in *arctica*) 2
- Mesepimeron entirely yellow 4
- 2(1). Pronotal black area with apical and basal pale indentations (Fig. 594g); form short, broad *arctica* (Schneider)
- Pronotal black area without pale indentations (Fig. 583f); form elongate, slender 3
- 3(2). Head dull, strongly alutaceous, densely punctured, with small, oval, median pale spot; elytral spots confluent (Fig. 583f) *americana* Crotch
- Head shiny, feebly alutaceous, not densely punctured, with transverse pale spot; elytral spots not confluent or feebly so (Fig. 586f) *washingtoni* Timberlake
- 4(1). Elytron almost entirely black except for apical pale spot or band (Fig. 604f), or maculate but with lateral margin of elytron black (Fig. 604g) *moesta moesta* LeConte
- Elytron not black, lateral margin of elytron never black 5
- 5(4). Elytron dull, strongly alutaceous, bivittate, often with median vitta broken apically 6
- Elytron shiny, not vittate 8
- 6(5). Pronotum with pale convergent spots (Fig. 612f) 7
- Pronotum without pale convergent spots (Fig. 585f) *falcigera* Crotch
- 7(6). Median vitta of elytron complete (Fig. 612f); coastal California *sinuata sinuata* Mulsant
- Median vitta of elytron broken apically (Fig. 612g); not occurring in coastal California *sinuata crotchii* Casey
- 8(5). Pronotum without convergent pale spots (Fig. 581f); elytron with 7 discrete black spots; form elongate, slender *tredecimpunctata tibialis* (Say)
- Species not agreeing with all above statements 9

9(8).	Pronotum with pale median spot at base (Fig. 589f)	10
-	Pronotum without pale median spot at base (Fig. 596a)	14
10(9).	Apex of elytron with sutural margin black (Figs. 589f)	11
-	Apex of elytron with sutural margin never black (Fig. 587f-h)	12
11(10).	Male genitalia as in figure 589a-d	<i>apicalis</i> Casey
-	Male genitalia as in Figure 592a-d	<i>expurgata</i> Casey
12(10).	Tarsal claw with tooth not closely appressed (Fig. 591i); Pacific coastal region	13
-	Tarsal claw with tooth closely appressed (Fig. 587i); transcontinental	<i>parenthesis</i> (Say)
13(12).	Markings on elytron heavy; pronotal markings reduced (Fig. 591g); Pacific Northwest	<i>lunatomaculata dobzhanskyi</i> Chapin
-	Markings on elytron reduced (Fig. 591f); pronotum with black area heavy; California	<i>lunatomaculata lunatomaculata</i> Motschulsky
14(9).	Elytron immaculate except scutellar spot usually present	15
-	Elytron with at least a transverse basal band, usually with additional black maculae	20
15(14).	Pronotum without convergent pale spots	<i>quinquesignata ambigua</i> LeConte
-	Pronotum with convergent pale spots	16
16(15).	Apex of basal lobe of male genitalia broadly triangular (Fig. 612a); northern California	<i>sinuata crotchii</i> Casey
-	Apex of basal lobe of male genitalia not broadly triangular	17
17(16).	Male genitalia with ventral ala well developed, visible in dorsal view (Fig. 606a)	19
-	Male genitalia with ventral ala not visible in dorsal view (Fig. 598a)	18
18(17).	Male genitalia as in Figure 598a	<i>glacialis extensa</i> Mulsant
-	Male genitalia as in Figure 595a	<i>quinquesignata ambigua</i> LeConte
19(17).	Basal lobe of male genitalia slender (Fig. 606a)	<i>convergens</i> Guerin
-	Basal lobe of male genitalia broad (Fig. 604a)	<i>moesta politissima</i> LeConte
20(14).	Pronotum with strong convergent pale spots (Fig. 602f); elytron with 6 or more black maculae, maculae often confluent; Ontario to Missouri, west to Saskatchewan	<i>quindecimmaculata</i> Mulsant
-	Pronotum and elytron not maculate as above, or if similar, not occurring east of Colorado	21
21(20).	Pronotal black area with lateral extension often extending to margin of pronotum, isolating or partially isolating the pale posterolateral area (Fig. 604j); or posterolateral area entirely black (Fig. 604f)	22
-	Pronotal black area without distinct lateral extension, pronotum with more or less uniform pale border (Fig. 612f)	26
22(21).	Elytron immaculate except for black subbasal band (Fig. 599f); coastal California	<i>glacialis extensa</i> Mulsant
-	Elytron with or without subbasal band, additional black maculae present; coastal California and elsewhere	23
23(22).	Elytron with maculae consistently heavy, confluent (Fig. 604j); southern British Columbia to northern Colorado	<i>moesta bowditchi</i> Johnson
-	Elytron with maculae reduced, if confluent, only narrowly so (Fig. 608f, g) (except <i>lecontei</i> in east central California)	24
24(23).	Basal lobe of male genitalia lacking dorsal crest	<i>caseyi</i> Johnson
-	Basal lobe of male genitalia with dorsal crest	25
25(24).	Basal lobe of male genitalia with dorsal crest bilobed	<i>glacialis lecontei</i> Mulsant
-	Basal lobe of male genitalia with dorsal crest entire	<i>quinquesignata quinquesignata</i> (Kirby)

- 26(21). Species occurring in coastal region from British Columbia to northern Oregon . 27
 – Species not occurring in above region 30
- 27(26). Length usually less than 5.50 mm; maculation on elytron, heavy, confluent (Fig. 612j) 28
 – Length usually more than 5.50 mm; maculation of elytron reduced, not or only feebly confluent 29
- 28(27). Pronotum with strong, convergent pale spots *sinuata spuria* LeConte
 – Pronotum without convergent pale spots *oregonensis* Crotch
- 29(27). Elytron with median black spots usually united to form transverse band (Fig. 596a); pronotum without or with convergent pale spots *quinesignata quinesignata* (Kirby)
 – Elytron without transverse band (Fig. 606f); pronotum always with convergent pale spots *convergens* Guerin
- 30(26). Species occurring from Saskatchewan and Colorado eastward 31
 – Species occurring from Saskatchewan, Colorado, and New Mexico westward .. 33
- 31(30). Pronotum always with strong, convergent pale spots; elytral maculation light, not confluent (Fig. 606h) *convergens* Guerin
 – Pronotum with or without convergent pale spots; elytral maculation heavy, usually at least partly confluent (Fig. 599a) 32
- 32(31). Base of elytron without transverse black band; common *glacialis glacialis* (F.)
 – Base of elytron usually with transverse black band; rare *quinesignata quinesignata* (Kirby)
- 33(30). Pronotum always with strong, convergent pale spots; elytral maculation light, not confluent (Fig. 606h); male genitalia as in Figure 606a *convergens* Guerin
 – Pronotum with or without convergent pale spots; elytral maculae usually heavy, somewhat confluent 34
- 34(33). Length usually less than 5.50 mm; form elongate, narrow (Fig. 612f) 35
 – Length usually more than 5.50 mm; form broad, robust (Fig. 599a) 36
- 35(34). Pronotum with convergent pale spots *sinuata crotchii* Casey
 – Pronotum without convergent pale spots *oregonensis* Crotch
- 36(34). Species occurring from Colorado and New Mexico to Idaho and eastern California; basal lobe of male genitalia with bilobed crest *glacialis lecontei* Mulsant
 – Species occurring from Alaska and Yukon Territory to New Mexico and southern California; basal lobe of male genitalia with crest not bilobed *quinesignata quinesignata* (Kirby)

Hippodamia tredecimpunctata tibialis (Say)

Fig. 581a–h; Map, Fig. 582

Coccinella tibialis Say, 1824, p. 94.

Hippodamia tibialis: Mulsant, 1850, p. 10.—Timberlake, 1919, p. 165.—Korschefsky, 1932, p. 331.—Timberlake, 1943, p. 51.

Hippodamia 13-punctata: Crotch, 1873, p. 368.—Crotch, 1874b, p. 94 (in part).—Wickham, 1894, p. 300.—Casey, 1899, p. 77.—Leng, 1903a, p. 40.—Blatchley, 1910, p. 511.—Leng, 1920, p. 215.

Hippodamia tredecimpunctata tibialis: Chapin, 1946, p. 5.—Wingo, 1952, p. 45.—Hatch, 1961, p. 168.—Brown and de Ruelle, 1962, p. 649.

Hippodamia tredecimpunctata: Belicek, 1976, p. 342.—Iablokoff-Khnzorian, 1982, p. 318.

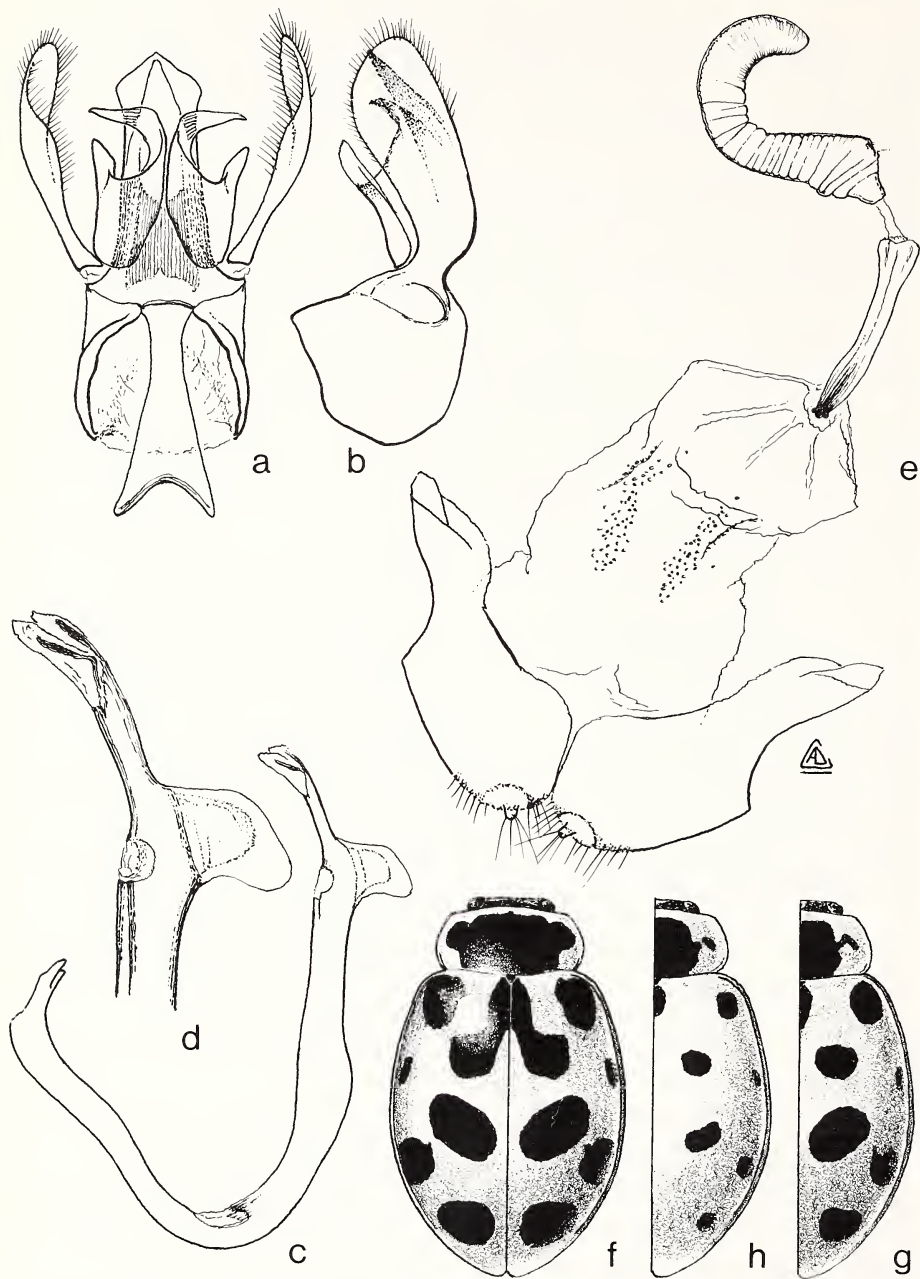


Fig. 581. *Hippodamia tredecimpunctata tibialis*.



Fig. 582. Distribution. *Hippodamia tredecimpunctata tibialis*.

Diagnosis. Length 4.50 to 6.40 mm, width 2.65 to 3.85 mm. Pronotum completely black medially, or with black area broken anterolaterally; elytron with 7 black spots, spots varying from completely free to somewhat confluent (Fig. 581f-h). Male genitalia as in Figure 581a-d. Female genitalia as in Figure 581e.

Discussion. This is an easily recognized species because of the numerous, always present elytral spots and small, slender form. The nominate subspecies is holarctic from Europe to western Asia, with another subspecies in Japan, China, and eastern Siberia.

Type locality. "Missouri".

Type depository. Type lost.

Distribution. Figure 582. Newfoundland to South Carolina, west to Alaska and northern California.

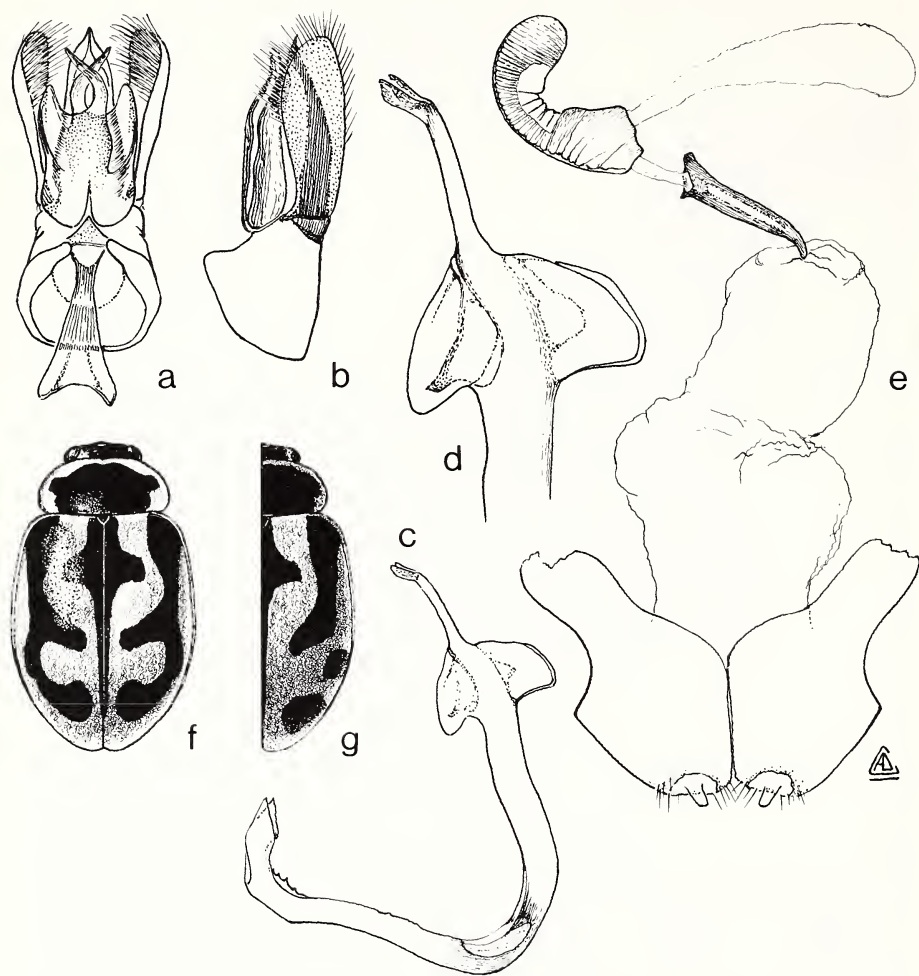


Fig. 583. *Hippodamia americana*.

Hippodamia americana Crotch

Fig. 583a-g; Map, Fig. 584

Hippodamia americana Crotch, 1873, p. 368.—Crotch, 1874b, p. IV.—Wickham, 1894, p. 306.—Johnson, 1910, p. 52.—Korschefsky, 1932, p. 338.—Chapin, 1946, p. 6.—Wingo, 1952, p. 45.—Brown and de Ruelle, 1962, p. 549.—Belicek, 1976, p. 342.

Diagnosis. Length 4.40 to 5.10, with 2.70 to 3.0 mm. Elytron somewhat vittate in appearance (Fig. 583f, g), apical spots connected or free. Mesepimeron black. Male genitalia as in Figure 583a-d. Female genitalia as in Figure 583e.

Discussion. This is not a commonly collected species, but is transcontinental in distribution. The black mesepimeron and vittate appearing elytron distinguish *H.*



Fig. 584. Distribution. *Hippodamia americana* (dot); *H. falcigera* (star); *H. washingtoni* (open star).

americana from other species of *Hippodamia*. I accept a female in the LeConte collection labeled "H.B./Type 6685(red paper)/americana Cr. Type/*Hippodamia americana* Cr." as the holotype.

Type locality. "Hudson's Bay".

Type depository. MCZ.

Distribution. Figure 584. ALBERTA: McMurray. BRITISH COLUMBIA: Fraser Lake. MANITOBA: Madge Lake. NORTHWEST TERRITORIES: Fort Smith; Norman Wells. ONTARIO: Moose Factory; Ogoki. SASKATCHEWAN: Waskesiu Lake. MICHIGAN: Lake Superior; White Fish Point. WISCONSIN: Waupaca.

Hippodamia falcigera Crotch

Fig. 585a-f; Map, Fig. 584

Hippodamia falcigera Crotch, 1873, p. 368.—Wickham, 1894, p. 306.—Leng, 1903, p. 44.—Casey, 1908, p. 399.—Johnson, 1910, p. 55.—Korschefsky, 1932, p. 341.—Timberlake, 1943, p. 51.—Chapin, 1946, p. 6.—Hatch, 1961, p. 168.—Brown and de Ruette, 1962, p. 650.—Belicek, 1976, p. 342.

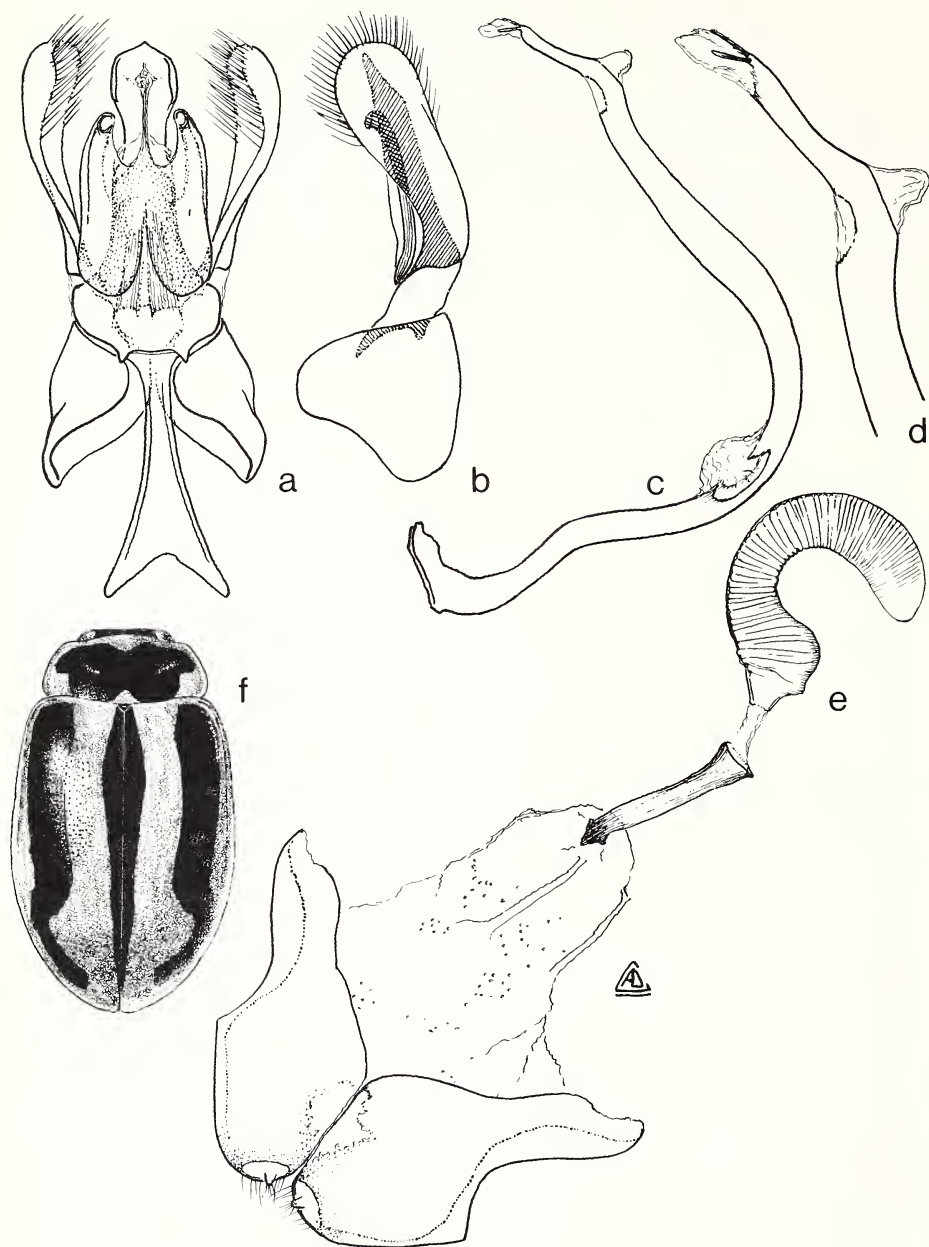


Fig. 585. *Hippodamia falcigera*.

Hippodamia sinuata albertana Casey., 1924, p. 157.—Chapin, 1946, p. 7.

Ceratomegilla cottlei Nunenmacher, 1934a, p. 20.

Hippodamia cottlei: Chapin, 1946, p. 6.

Diagnosis. Length 5.0 to 6.0 mm, width 2.90 to 3.50 mm. Elytron bivittate (Fig. 585f) with broad median vitta sometimes broken apically. Mesepimeron yellow. Male genitalia as in Figure 585a–d. Female genitalia as in Figure 585e.

Discussion. This is not a commonly collected species and the geographic range is restricted. The vittate appearance is similar to that of *H. sinuata sinuata* or *H. s. crotchii*, but *falcigera* is larger and the 3 forms are allopatric. I here designate and label a female of *falcigera* bearing the labels “H.B./Type 6684/falcigera Cr. Type/Hippodamia falcigera Cr.” as the lectotype. Two other specimens in the series labeled “SI L.” (Slave Lake) are designated and labeled as paralectotypes. The type of *H. s. albertana* in the Casey collection is a unique female (holotype). The type of *C. cottlei* is a unique male (holotype) labeled “Yellowstone Pk. VII-8-30/E. R. Leach/male sign/Ceratomegilla cottlei Nun.”

Type locality. Of *falcigera*, Slave Lake, “Hudson’s Bay” (lectotype here designated); of *albertana*, Edmonton, Alberta; of *cottlei*, Yellowstone Park, Wyoming.

Type depository. Of *falcigera*, MCZ; of *albertana*, USNM (35511); of *cottlei*, CAS.

Distribution. Figure 584. ALBERTA: Banff; Edmonton; Hotchkiss; McMurray; Tofield. BRITISH COLUMBIA: Chilcotin; Summerland. NORTHWEST TERRITORIES: Aklavik; Fort Simpson; Fort Smith. YUKON TERRITORY: Canyon Creek; Haines Junction; Stewart River. IDAHO: Moscow. WYOMING: Yellowstone Park.

Hippodamia washingtoni Timberlake

Fig. 586a–h; Map, Fig. 584

Hippodamia washingtoni Timberlake, 1939, p. 265.—Chapin, 1946, p. 7.— Hatch, 1961, p. 168.—Brown and de Ruelle, 1962, p. 650.—Belicek, 1976, p. 343.

Diagnosis. Length 5.40 to 6.70 mm, width 3.25 to 4.0 mm. Dorsal color pattern variable (Fig. 576f–h), but usually spotted, apical spots free or feebly connected. Mesepimeron black. Male genitalia as in Figure 586a–d. Female genitalia as in Figure 586e.

Discussion. The black mesepimeron and shiny head distinguish *H. washingtoni*. The male genitalia are similar to those of *H. falcigera*, but in external appearance *H. washingtoni* is most similar to *H. americana*.

Type locality. Longmire Spring, Mount Rainier, Washington.

Type depository. UCR.

Distribution. Figure 584. BRITISH COLUMBIA: Anyox. IDAHO: Moscow Mt. OREGON: Bear Springs; Blue Mountains; Clackamas Lake; Crater Lake; Mt. Hood. WASHINGTON: Hoquiam; Monroe.

Hippodamia parenthesis (Say)

Fig. 587a–i; Map, Fig. 588

Coccinella parenthesis Say, 1824, p. 93.

Coccinella tridens Kirby, 1837, p. 229.

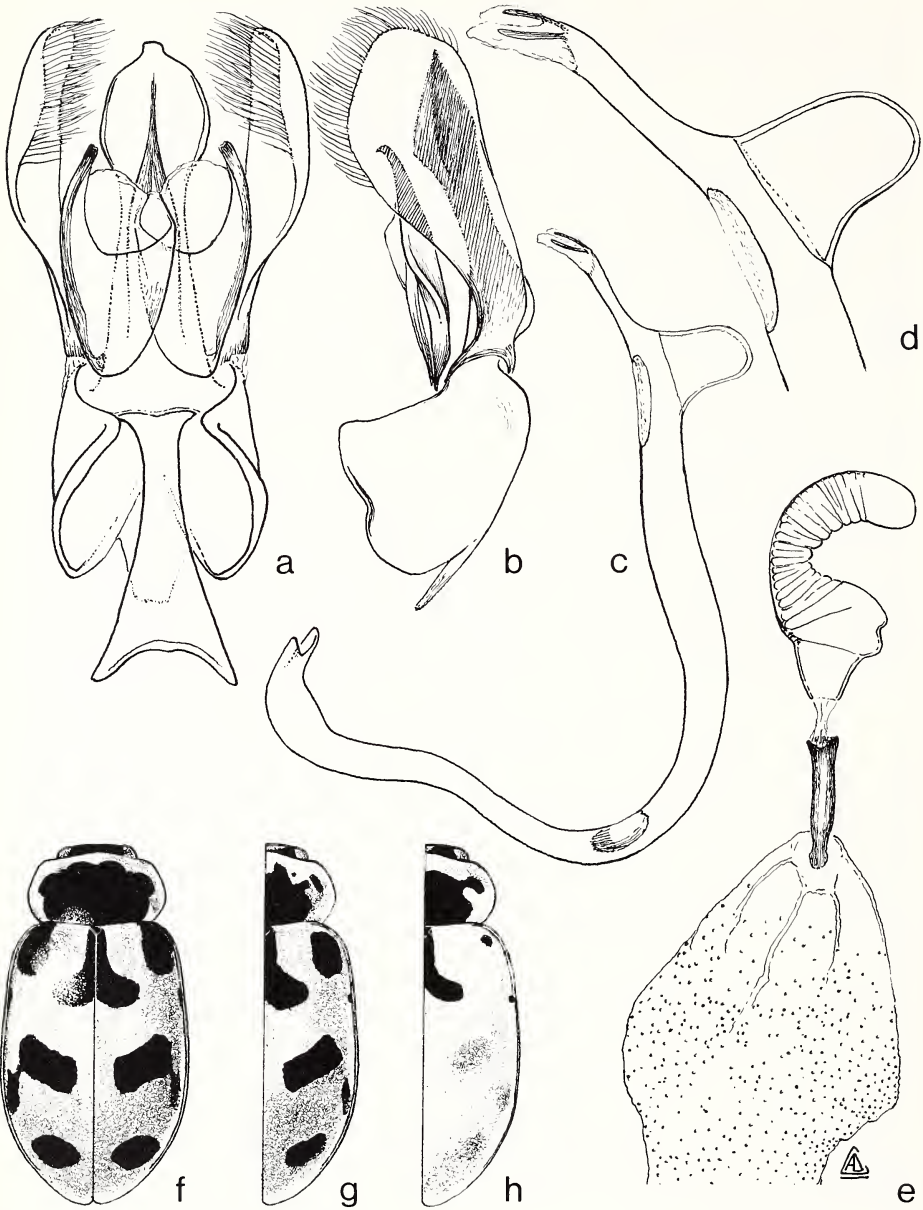


Fig. 586. *Hippodamia washingtoni*.

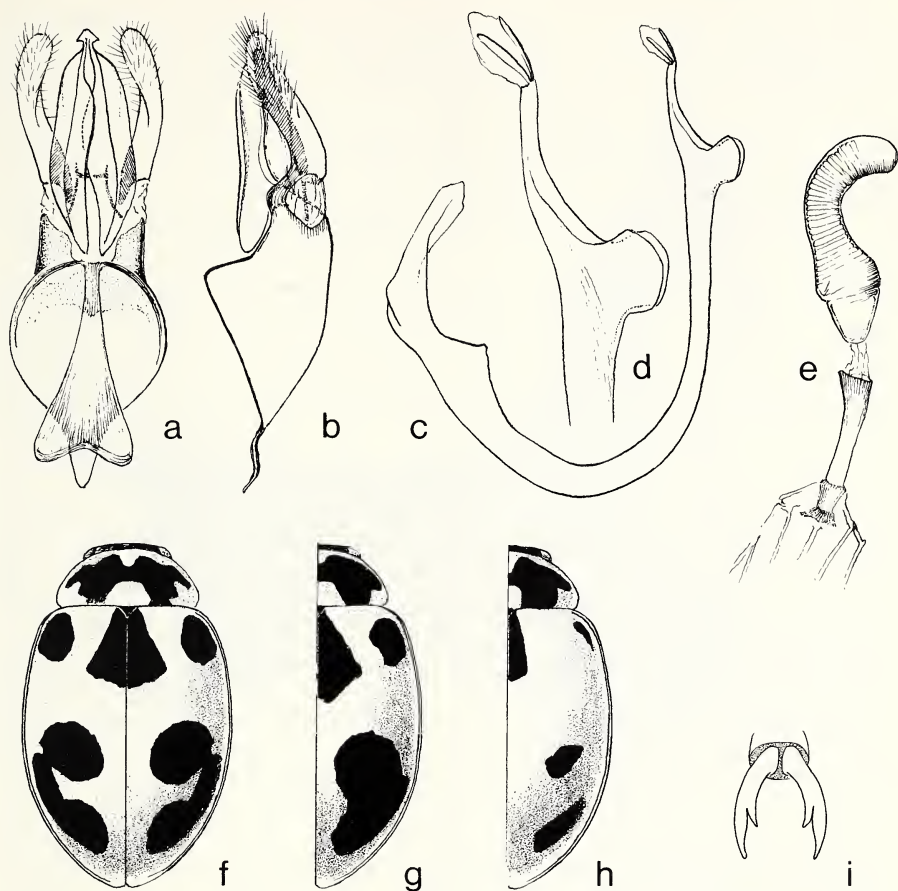


Fig. 587. *Hippodamia parenthesis*.

Adonia tridens: Mulsant, 1850, p. 40.

Hippodamia tridens: Crotch, 1874b, p. 97.

Adonia parenthesis: Mulsant, 1850, p. 40.—Mulsant, 1866, p. 32.

Hippodamia parenthesis: Crotch, 1873, p. 368.—Crotch, 1874b, p. 97.—Wickham, 1894, p. 300.—Casey, 1899, p. 81.—Leng, 1903a, p. 44.—Casey, 1908, p. 399.—Blatchley, 1910, p. 109.—Johnson, 1910, p. 52.—Timberlake, 1919, p. 165.—Korschefsky, 1932, p. 343.—Chapin, 1946, p. 8.—Wingo, 1952, p. 45.—Hatch, 1961, p. 167.—Brown and de Ruette, 1962, p. 650.—Belicek, 1976, p. 343.

Hippodamia parenthesis albomaculata Fitch, 1862, p. 853.

Hippodamia parenthesis approximata Fitch, 1862, p. 853.

Hippodamia parenthesis confluenta Fitch, 1862, p. 853.

Hippodamia parenthesis connata Fitch, 1862, p. 853.

Hippodamia parenthesis discopunctata Fitch, 1862, p. 853.



Fig. 588. Distribution. *Hippodamia parenthesis*.

Hippodamia parenthesis insulata Fitch, 1862, p. 853.

Hippodamia parenthesis linearis Fitch, 1862, p. 853.

Hippodamia parenthesis lituricollis Fitch, 1862, p. 853.

Hippodamia parenthesis permacrifrons Fitch, 1862, p. 853.

Hippodamia parenthesis triangularis Fitch, 1862, p. 853.

Hippodamia parenthesis tridentifrons Fitch, 1862, p. 853.

Hippodamia parenthesis nimia Fitch, 1862, p. 853.

Hippodamia parenthesis ab. *albomaculata*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 343.

Hippodamia parenthesis ab. *approximata*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 343.

Hippodamia parenthesis ab. *confluenta*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 343.

- Hippodamia parenthesis* ab. *connata*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 343.
- Hippodamia parenthesis* ab. *discopunctata*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 343.
- Hippodamia parenthesis* ab. *insulata*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 343.
- Hippodamia parenthesis* ab. *linearis*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 343.
- Hippodamia parenthesis* ab. *lituricollis*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 343.
- Hippodamia parenthesis* ab. *permacrifrons*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 343.
- Hippodamia parenthesis* ab. *triangularis*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 343.
- Hippodamia parenthesis* ab. *tridentifrons*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 343.
- Hippodamia parenthesis* ab. *nimia*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 343.

Diagnosis. Length 3.75 to 5.60 mm, width 2.25 to 4.50 mm. Elytron spotted, apical spots often suffused, sutural margin at apex without black spot (Fig. 587f–h). Tarsal claw with tooth closely appressed (Fig. 587i). Male genitalia as in Figure 587a–d. Female genitalia as in Figure 587e.

Discussion. This species ranges from Nova Scotia to South Carolina and west to Alaska and California. East of the Mississippi River it is easily recognized because no similar appearing species occur there. West of the Mississippi it can be confused with *lunatomaculata*. The key characters will usually separate examples of *parenthesis*, but male genitalia must be examined in some instances. A male syntype of *tridens* labeled “Syntype/Type/N. Amer./Coccinella tridens Kirby n. amer 5959. Rev. W. Kirby” is here designated and labeled as the lectotype.

Type locality. Of *parenthesis*, not stated, “United States”; of all Fitch names, “New York”; of *tridens*, “North America” (lectotype here designated).

Type depository. Of *parenthesis*, type lost; of Fitch types, not located; of *tridens*, BMNH.

Distribution. Figure 588. Nova Scotia to South Carolina, west to Alaska and California.

Hippodamia apicalis Casey

Fig. 589a–i; Map, Fig. 590

- Hippodamia apicalis* Casey, 1899, p. 81.—Weise, 1899b, p. 377.—Casey, 1908, p. 399.—Johnson, 1910, p. 54.—Hatch, 1961, p. 167.—Belicek, 1976, p. 344.
- Hippodamia parenthesis* var. *apicalis*: Leng, 1903a, p. 44.
- Hippodamia lunatomaculata apicalis*: Timberlake, 1919, p. 166.
- Hippodamia lunatmarginata* ab. *apicalis*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 342.
- Hippodamia apicalis apicalis*: Chapin, 1946, p. 9.—Brown and de Ruelle, 1962, p. 650.
- Hippodamia lengi* Johnson, 1910, p. 55.—Timberlake, 1919, p. 176. **New Synonymy.**

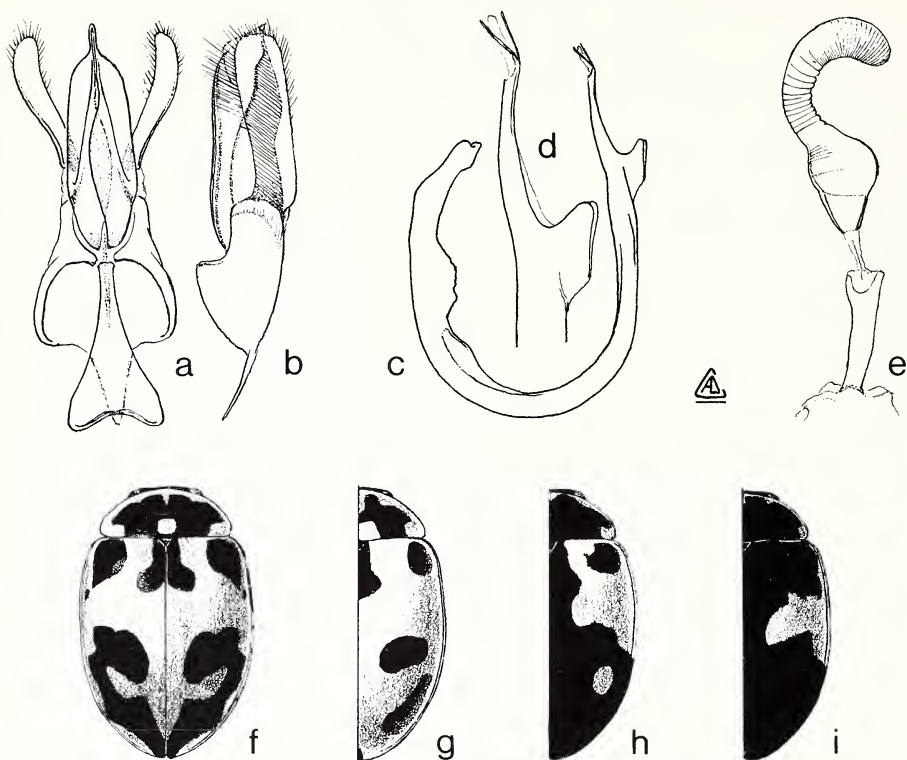


Fig. 589. *Hippodamia apicalis*.

Hippodamia lunatomarginata ab. *lengi*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 342.

Hippodamia apicalis lengi: Chapin, 1946, p. 9.

Adalia nigromaculata Nunenmacher, 1934a, p. 20.

Hippodamia nigromaculata: Chapin, 1946, p. 9.

Hippodamia apicalis tricolor Nunenmacher, 1946, p. 72.—Hatch, 1961, p. 167.

Diagnosis. Length 3.50 to 4.70 mm, width 2.25 to 2.90 mm. Color pattern of elytron variable (Fig. 589f–i), but always with suture of elytron black, at least at extreme apex. Tarsal claw with tooth not closely appressed. Male genitalia as in Figure 589a–d. Female genitalia as in Figure 589e.

Discussion. I have not been able to separate this species from *H. expurgata* except by examination of the male genitalia. Chapin (1946) illustrated a specimen of *H. apicalis* which lacked a black spot at the sutural apex, but on examining the USNM collection, I find that this specimen is *H. parenthesis* misidentified as *H. apicalis*. I have not seen any *H. apicalis* that lack this sutural spot. Neither *H. parenthesis* nor *H. lunatomaculata* possess a sutural spot, therefore we have 2 pairs of species, each

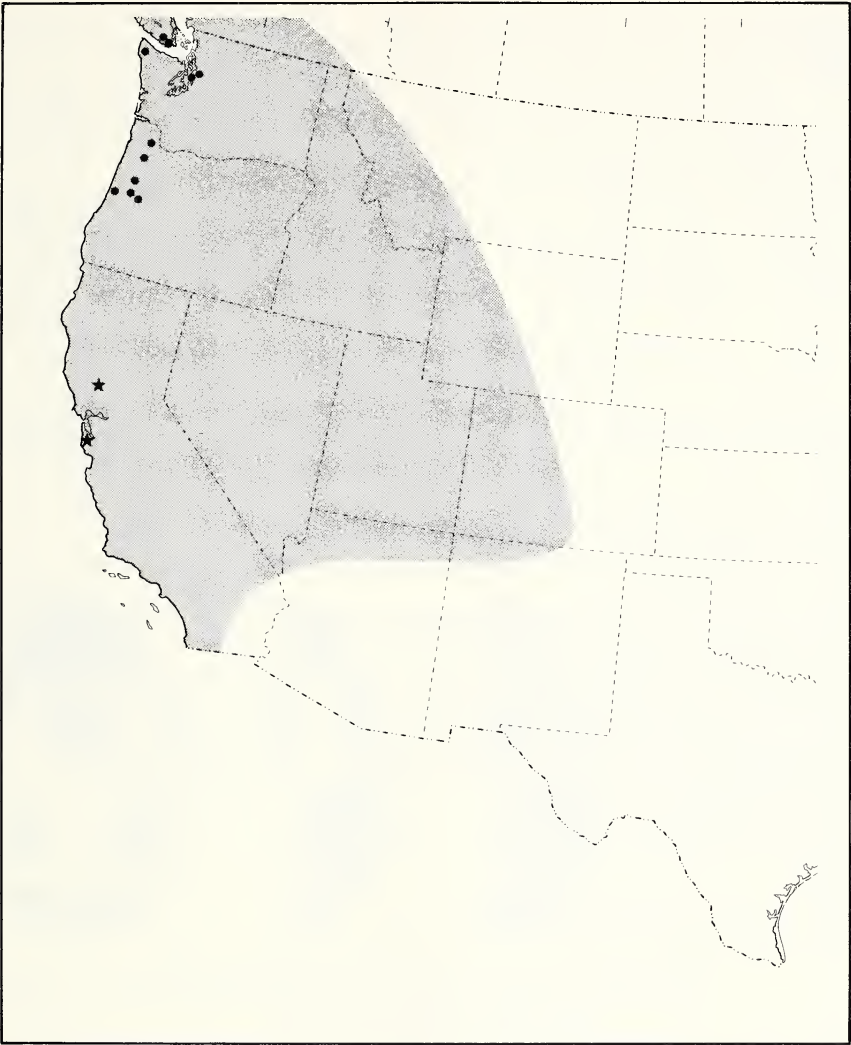


Fig. 590. Distribution. *Hippodamia apicalis* (shaded); *H. lunatomaculata lunatomaculata* (star); *H. l. dobzhanskyi* (dot).

pair readily separable from the other. There are 4 types of *H. apicalis* in the Casey collection, the 4th of which (male) I here designate and label the lectotype, the remainder as paralectotypes. *Hippodamia lengi* was treated as a subspecies by Chapin (1946), but I have seen specimens of typical *H. apicalis* that grade into the *H. lengi* phenotype in a geographic cline, therefore I consider *H. lengi* a junior synonym of *H. apicalis*. Johnson designated a specimen in the Carnegie Museum (Pittsburgh) as

the holotype of *H. lengi*. Two type specimens of *A. nigromaculata* Nunenmacher are in the CAS Collection. I designate and label a specimen labeled "San Diego Co. Cal./G.H. Field collector/*Adalia nigromaculata* Nun." as the lectotype.

Type locality. Of *apicalis*, Reno, Washoe Co., Nevada (lectotype here designated); of *lengi*, California; of *tricolor*, Lassen Co., California; of *nigromaculata*, San Diego, California (lectotype here designated).

Type depository. Of *apicalis*, USNM (35513); of *lengi*, CM; of *tricolor*, CAS; of *nigromaculata*, CAS.

Distribution. Figure 590. Montana to New Mexico, west to southern British Columbia and southern California.

Hippodamia lunatomaculata lunatomaculata Motschulsky

Fig. 591a-f; Map, Fig. 590

Hippodamia lunatomaculata Motschulsky, 1845b, p. 382.—Timberlake, 1919, p. 166 (in part).—Timberlake, 1943, p. 10.—Hatch, 1961, p. 167.—Belicek, 1976, p. 344.

Hippodamia lunatomaculata lunatomaculata: Chapin, 1946, p. 10.

Hippodamia lunatomarginata: Korschefsky, 1932, p. 342.

Hippodamia parenthesis Casey, 1899, p. 81 (in part).—Johnson, 1910, p. 53 (in part).

Diagnosis. Length 4.15 to 5.60 mm, width 2.70 to 3.70 mm. Pronotal color pattern heavily maculate; elytron lightly maculate with spots not connected; sutural margin at apex without black spot (Fig. 591f). Tarsal claw with tooth not closely appressed (Fig. 591i). Male genitalia as in Figure 591a-d. Female genitalia as in Figure 591e.

Discussion. *Hippodamia l. lunatomaculata* is likely to be confused only with *H. parenthesis* which has the tooth of the tarsal claw more closely appressed. This character is difficult to assess without some experience and male genitalia must be examined in doubtful cases.

Type locality. Vicinity of San Francisco Bay, California (restricted by Chapin, 1946).

Type depository. Type not examined.

Distribution. Figure 590. CALIFORNIA: Half Moon Bay; Willows.

Hippodamia lunatomaculata dobzhanskyi Chapin

Fig. 591g, h; Map, Fig. 590

Hippodamia lunatomaculata dobzhanskyi Chapin, 1946, p. 11.—Hatch, 1961, p. 167.—Brown and de Ruelle, 1962, p. 650.

Description as for *H. l. lunatomaculata* except pronotum with reduced maculation and elytron with heavy maculation (Fig. 591g, h).

I am maintaining the 2 subspecies proposed by Chapin (1946), but without any degree of confidence in the validity of this arrangement. These are mainly coastal forms and it is most likely that they form a continuous geographic cline that cannot be divided at any one point. See discussion under *l. lunatomaculata* for comparative remarks.

Type locality. Port Angeles, Washington.

Type depository. USNM (57891).

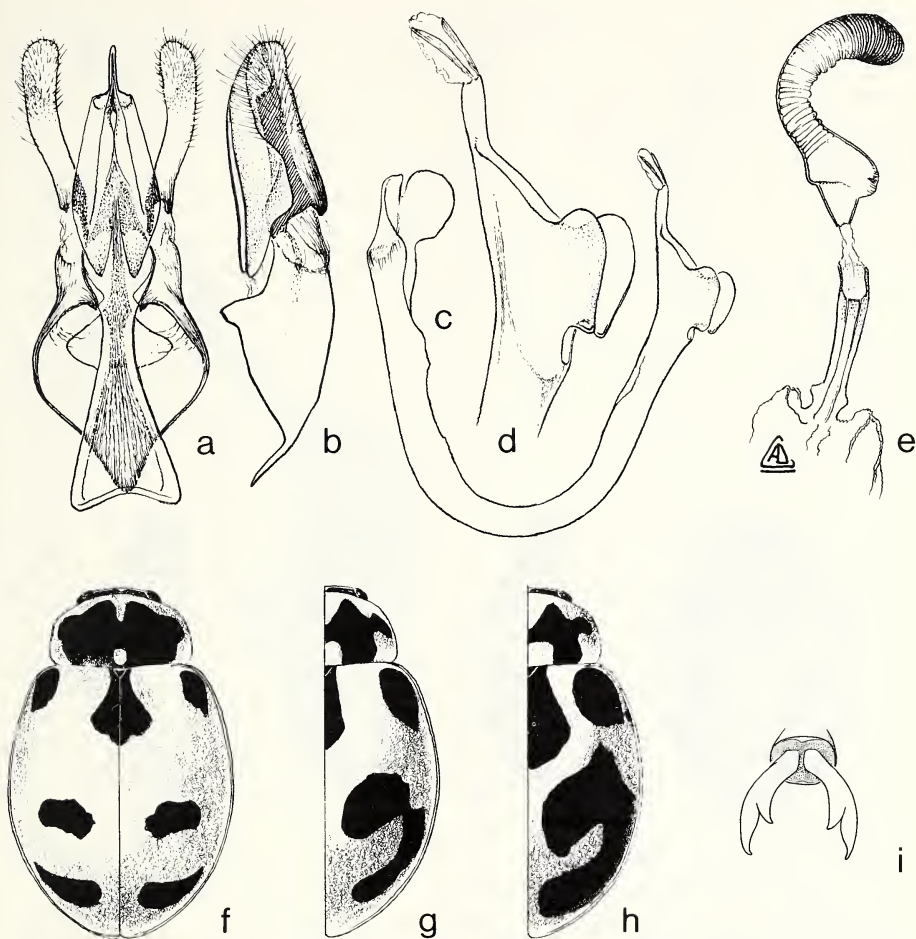


Fig. 591. *Hippodamia lunatamaculata lunatamaculata*; *H. l. dobzhanskyi*.

Distribution. Figure 590. BRITISH COLUMBIA: Nainamo, Victoria. CALIFORNIA: Tacumoa. OREGON: Amity; Corvallis; Dever; Forest Grove; Newport; Willamette Valley. WASHINGTON: Olympic Peninsula; Medical Lake; Seattle.

Hippodamia expurgata Casey

Fig. 592a-i; Map, Fig. 593

Hippodamia parenthesis expurgata Casey, 1908, p. 400.

Hippodamia lunatamaculata expurgata: Timberlake, 1919, p. 166.

Hippodamia lunatomarginata ab. *expurgata*: Leng, 1920, p. 215.—Korschefsky, 1932, p. 342.

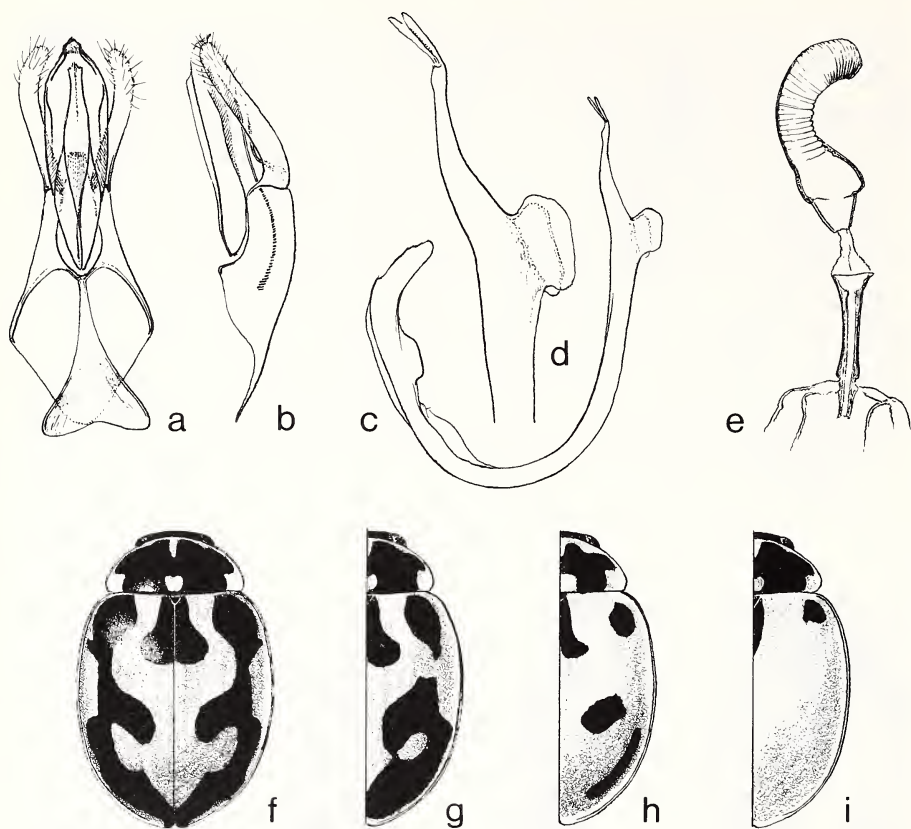


Fig. 592. *Hippodamia expurgata*.

Hippodamia expurgata: Chapin, 1946, p. 12.—Hatch, 1961, p. 167.—Brown and de Ruette, 1962, p. 650.

Diagnosis. Length 3.50 to 5.0 mm, width 2.20 to 3.25 mm. Color pattern as in *H. apicalis* except sutural spot on elytron occasionally lacking (Fig. 592f-i). Male genitalia as in Figure 592a-d. Female genitalia as in Figure 592e.

Discussion. Examination of the male genitalia is the only certain way I can find to separate this species from *H. apicalis*. The 2 species are sympatric in the Rocky Mountain states, allopatric or nearly so in the Pacific Coast states. Chapin (1946) stated that in lightly maculate specimens of *H. expurgata* the apical sutural spot is usually absent; on examination of the material Chapin saw, I found that the spot is usually present but extremely reduced. Those specimens with the spot completely gone will key to *H. parenthesis*, and again the male genitalia must be examined. Belicek (1976) synonymized *H. expurgata* with *H. apicalis*, apparently basing this decision on those male specimens seen by Chapin (1946) that have the apex of the basal lobe somewhat attenuate. I do not accept this synonymy because even in the



Fig. 593. Distribution. *Hippodamia expurgata* (shaded); *H. arctica* (dot).

specimens in question it is apparent what species they are, and in normal individuals there is no question that the genitalia are substantially different. There are 2 types of *H. expurgata* in the Casey collection, the second of these, a male, I here designate and label as the lectotype, the first (female) as a paralectotype.

Type locality. Boulder, Colorado (lectotype here designated).

Type depository. USNM (35514).

Distribution. Figure 593. Saskatchewan to New Mexico, west to Yukon Territory and Arizona.

Hippodamia arctica (Schneider)

Fig. 594a-i; Map, Fig. 593

Coccinella arctica Schneider, 1792, p. 148.

Adonia arctica: Korschefsky, 1932, p. 346.

Adonia amoena Scott, 1933, p. 126 (not *Adonia amoena* Falderman).

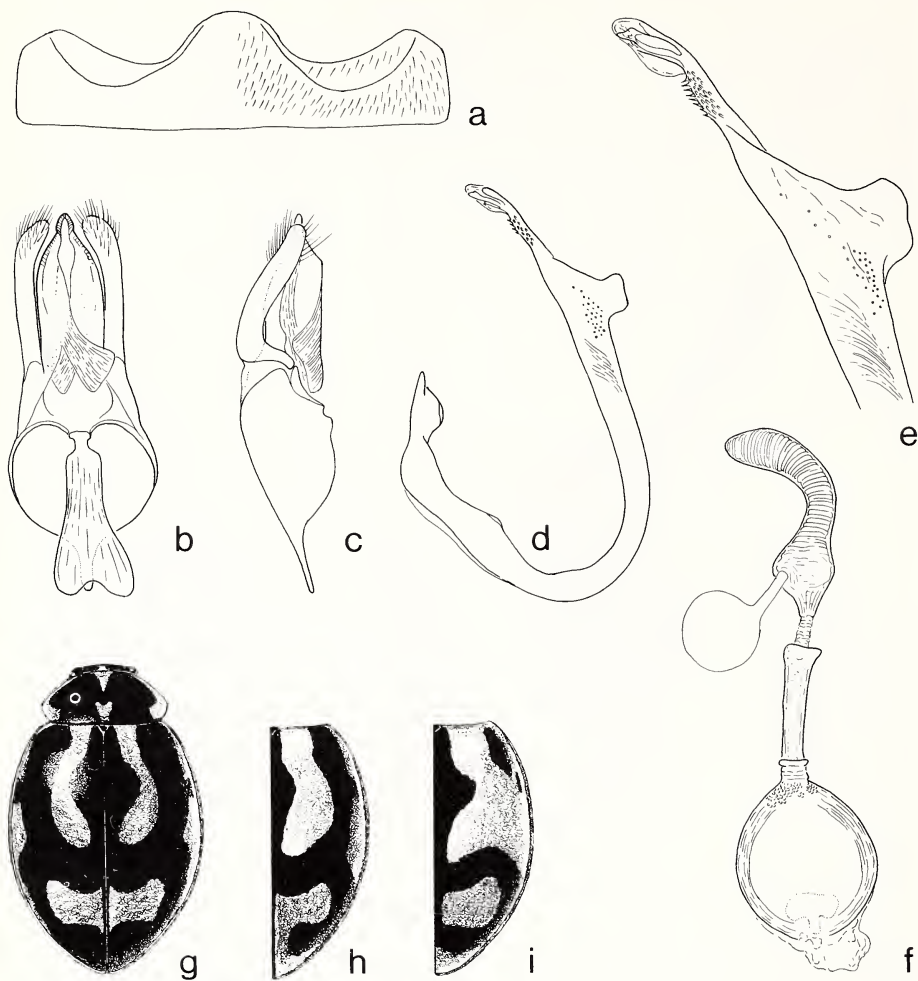


Fig. 594. *Hippodamia arctica*.

Hippodamia arctica: Crotch, 1874b, p. 97.—Brown and de Ruelle, 1962, p. 650.—Belicek, 1976, p. 344.

Hippodamia (Parippodamia) arctica: Iablokoff-Khnzorian, 1979, p. 51.—Iablokoff-Khnzorian, 1982, p. 322.

Diagnosis. Length 4.0 to 4.50 mm, width 2.50 to 2.80 mm. Dorsal color mostly black with yellowish red marking (Fig. 594g–i). Mesepimeron usually black, occasionally bicolored, rarely yellow. Postcoxal line always complete (Fig. 594a). Male genitalia as in Figure 594b–e. Female genitalia as in Figure 594f.

Discussion. The short, broad form, mostly black dorsal surface, always complete postcoxal lines and usually black mesepimeron distinguish *H. arctica*. Brown and de

Ruette (1962) placed this species in *Hippodamia* and discussed the generic and specific relationships.

Type locality. "Lapland."

Type depository. Type not examined.

Distribution. Figure 593. BRITISH COLUMBIA: Summit Lake, mi. 379 and 392, Alaska Hwy. LABRADOR: Hebron. QUEBEC: Fort Chimo; Great Whale R.; Greenly Island. YUKON TERRITORY: Kirkman Creek; Swim Lakes. ALASKA: Eagle; Rampart House; Umiat.

Hippodamia quinquesignata quinquesignata (Kirby)

Fig. 595a-e, 596a-d; Map, Fig. 597

Coccinella 5-signata Kirby, 1837, p. 230.

Hemisphaerica quinquesignata: Hope, 1840, p. 157.

Hippodamia quinquesignata: Mulsant, 1850, p. 15.—Mulsant, 1866, p. 10.—Crotch, 1873, p. 366.—Crotch, 1874b, p. 95.—Casey, 1899, p. 78.—Leng, 1903a, p. 40.—Casey, 1908, p. 395.—Timberlake, 1919, p. 171.—Korschefsky, 1932, p. 344.—Wingo, 1952, p. 45.—Hatch, 1961, p. 171.—Belicek, 1976, p. 345.

Hippodamia quinquesignata quinquesignata: Chapin, 1946, p. 15.—Brown and de Ruette, 1962, p. 651.

Hippodamia mulsanti LeConte, 1852, p. 131.—Crotch, 1873, p. 366.

Hippodamia leporina Mulsant, 1856, p. 135.—Crotch, 1873, p. 366.

Hippodamia quinquesignata ab. *leporina*: Leng, 1920, p. 216.—Korschefsky, 1932, p. 344.

Hippodamia subsimilis Casey, 1899, p. 79.—Timberlake, 1919, p. 172.—Chapin, 1946, p. 13.

Hippodamia vernix subsimilis: Casey, 1908, p. 396.

Hippodamia vernix Casey, 1899, p. 79.—Timberlake, 1919, p. 171.—Chapin, 1946, p. 13.

Hippodamia coccinea Casey, 1908, p. 395.—Timberlake, 1919, p. 171.

Hippodamia uteana Casey, 1908, p. 397.—Timberlake, 1919, p. 171.

Hippodamia quinquesignata var. *uteana*: Chapin, 1946, p. 15.—Belicek, 1976, p. 345.

Hippodamia uteana quadraria Casey, 1924, p. 156.—Chapin, 1946, p. 13.

Hippodamia convergens pugetana Casey, 1924, p. 156.—Belicek, 1976, p. 345.

Hippodamia quinquesignata var. *pugetana*: Chapin, 1946, p. 15.

Diagnosis. Length 4.0 to 7.0 mm, width 2.80 to 5.0 mm. Pronotum with or without convergent pale spots; elytral color pattern extremely variable (Fig. 596a-d). Male genitalia as in Figure 595a-d. Female genitalia as in Figure 595e.

Discussion. This species and some of the other large, robust species (*H. glacialis*, *H. convergens*, *H. caseyi*, etc.) of *Hippodamia* are very difficult to distinguish without referring to male genitalia. *Hippodamia quinquesignata* is a widespread species but not particularly common in the east, and extremely variable in the dorsal color pattern. *Hippodamia glacialis*, especially the subspecies *H. lecontei*, is usually confused with *H. quinquesignata*. In eastern North America *H. glacialis* and *H. quinquesignata* can be separated on the key characters. Chapin (1946) retained the names

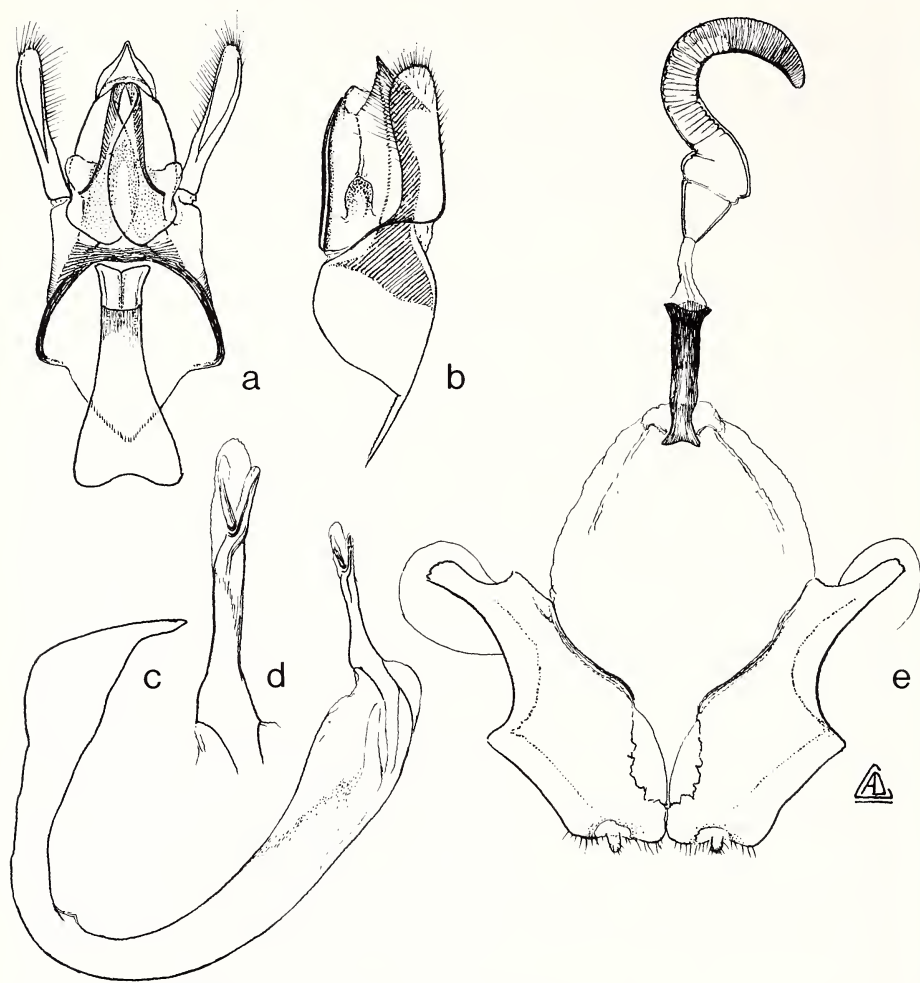


Fig. 595. *Hippodamia quinquesignata quinquesignata*.

H. pugetana and *H. uteana* as varieties, but I can see no basis for maintaining them and consider them junior synonyms of *H. quinquesignata*. There are unique type specimens (holotypes) of *H. vernix*, *H. subsimilis*, *H. quadraria* and *H. coccinea* in the Casey collection. There are 19 types of *pugetana*, one of which, a male, I here designate and label as the lectotype, the remainder as paralectotypes. There are 4 type specimens of *uteana* and I here designate and label a male as the lectotype, the remainder as paralectotypes. The holotype of *quinquesignata* is a female labeled "Type/ n. amer 5960a/Coccinella quinquesignata Kirby n. america. 5960. Rev. Wm. Kirby.

Type locality. Of *quinquesignata*, "Lat. 65" (near Great Bear Lake); of *mulstanti*, Pic River, Lake Superior; of *leporina*, California; of *subsimilis*, California?; of *vernix*, Wyoming; of *coccinea*, Boulder, Colorado; of *uteana*, Nephi, Utah (lectotype here

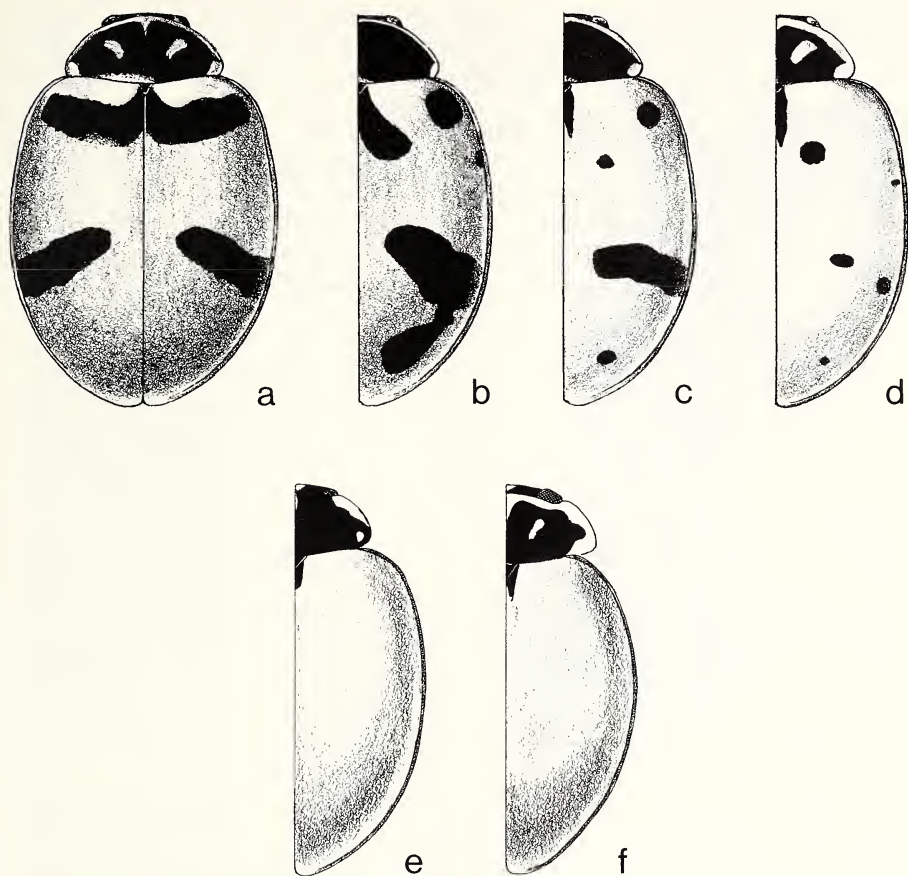


Fig. 596. *Hippodamia quinquesignata quinquesignata*; *H. q. ambigua*.

designated); of *quadraria*, Edmonton, Alberta; of *pugetana*, Fairfield, Washington (lectotype here designated).

Type depository. Of *quinquesignata*, BMNH; of *mulsanti*, not examined; of *leporina*, not examined; of *subsimilis* (35506), *vernix* (35507), *coccinea* (35495), *uteana* (35499), *quadraria* (35500), and *pugetana* (35501), USNM.

Distribution. Figure 597. Prince Edward Island to Yukon Territory and Alaska, south to New Mexico and California.

Hippodamia quinquesignata ambigua LeConte

Fig. 596e, f; Map, Fig. 597

Hippodamia ambigua LeConte, 1852, p. 131.—Crotch, 1873, p. 366.—Crotch, 1874b, p. 96.—Casey, 1899, p. 79.—Leng, 1903, p. 41.—Timberlake, 1919, p. 172.

Hippodamia 5-signata ambigua: Timberlake, 1943, p. 12.

Hippodamia quinquesignata ambigua: Chapin, 1946, p. 16.—Hatch, 1961, p. 173.

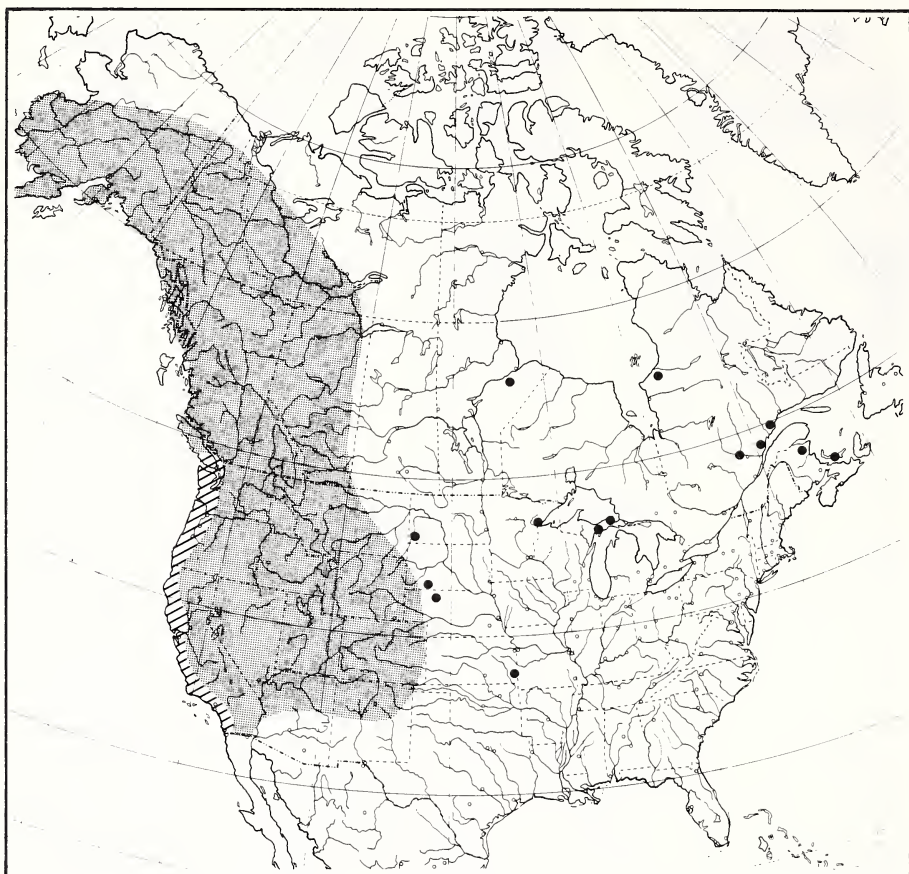


Fig. 597. Distribution. *Hippodamia quinquesignata quinquesignata* (shaded), eastern localities dotted; *H. q. ambigua* (cross hatch).

Hippodamia punctulata LeConte, 1852, p. 131.—Crotch, 1873, p. 366.—Crotch, 1874b, p. 96.—Casey, 1899, p. 79.—Timberlake, 1919, p. 172.

Hippodamia quinquesignata punctulata: Chapin, 1946, p. 16.

Hippodamia obliqua Casey, 1899, p. 79.—Chapin, 1946, p. 13.

Hippodamia quinquesignata obliqua: Timberlake, 1943, p. 12.

Description as for *H. q. quinquesignata* except elytron almost always immaculate; pronotum with or without convergent pale spots (Fig. 596e, f).

Crotch (1873) and Casey (1899) considered *H. punctulata* a synonym of *H. ambigua*, but Crotch (1874) revived the name *H. punctulata* and authors since have considered it a subspecies or race of *H. ambigua*. Timberlake (1943) pointed out the difficulty in separating *H. ambigua* and *H. punctulata* due to the variability of the thoracic color pattern. *Hippodamia punctulata* is the form lacking convergent pro-

notal spots; *H. ambigua* has those spots; however, most large series from a single locality will contain examples of both forms. I cannot logically maintain these forms as subspecies and therefore regard *H. punctulata* as a junior synonym of *H. ambigua*. *Hippodamia obliqua* Casey is a form of *H. ambigua* with the pronotum having the black area reduced and the convergent pale spots large. *Hippodamia q. ambigua* is a Pacific Coast subspecies ranging from southern California to northwestern Washington, but some of the northern series examined contain some specimens not separable from *H. q. quinquesignata*. In spite of this, I feel it best to maintain both subspecies for the present. *Hippodamia obliqua* is represented by 7 types in the Casey collection, and I here designate and label a male as the lectotype and the remainder as paralectotypes. A female of *H. ambigua* in the LeConte collection labeled "(blue disc)/4007/Type 6680 (red paper)/*H. ambigua* Lec." is here designated and labeled as the lectotype. Three other specimens in the same series, each bearing a gold disc, are designated and labeled as paralectotypes. A male of *punctulata* in the LeConte collection labeled "(gold disc)/Type 6651 (red paper)/*H. punctulata* LeC." is here designated and labeled as the lectotype. Three other specimens in the same series, each bearing a gold disc, are designated and labeled as paralectotypes.

Type locality. Of *ambigua*, Oregon (lectotype here designated); of *punctulata*, California (lectotype here designated); of *obliqua*, Santa Rosa, Sonoma Co., California (lectotype here designated).

Type depository. Of *ambigua* and *punctulata*, MCZ; of *obliqua*, USNM (35503).

Distribution. Figure 597. Southern British Columbia to southern California (coastal localities).

Hippodamia glacialis glacialis (F.)

Fig. 598a-e, 599a, b; Map, Fig. 600

Coccinella glacialis F., 1775, p. 80.

Hippodamia glacialis: Mulsant, 1850, p. 18.—Mulsant, 1866, p. 12.—Crotch, 1873, p. 367.—Crotch, 1874b, p. 95.—Casey, 1899, p. 79.—Leng, 1903a, p. 41.—Blatchley, 1910, p. 512.—Johnson, 1910, p. 19.—Timberlake, 1919, p. 174.—Korschefsky, 1932, p. 341.—Timberlake, 1943, p. 12.—Wingo, 1952, p. 45.—Belicek, 1976, p. 346 (in part).

Hippodamia glacialis glacialis: Chapin, 1946, p. 18.—Brown and de Ruelle, 1962, p. 651.

Diagnosis. Length 5.50 to 8.0 mm, width 3.60 to 5.60 mm. Pronotum with or without convergent pale spots; elytron not particularly variable, immaculate except for apical spot and subapical transverse band, these sometimes suffused (Fig. 599a, b). Male genitalia as in Figure 598a-d. Female genitalia as in Figure 598e.

Discussion. This is primarily an eastern North American subspecies where it is easily recognized by the dorsal maculation. However, at the western limit of the range (Manitoba, Saskatchewan, Colorado) specimens occur which are intergrades with *H. g. lecontei*. Belicek (1976) stated that Chapin (1946) had synonymized *H. lecontei* and *H. extensa* with *H. glacialis*, but this is not correct; Chapin merely reduced them to subspecific rank, a decision with which I presently concur. A single type specimen of *H. glacialis* exists and has been compared with eastern specimens of *H. glacialis* by John Kingsolver.

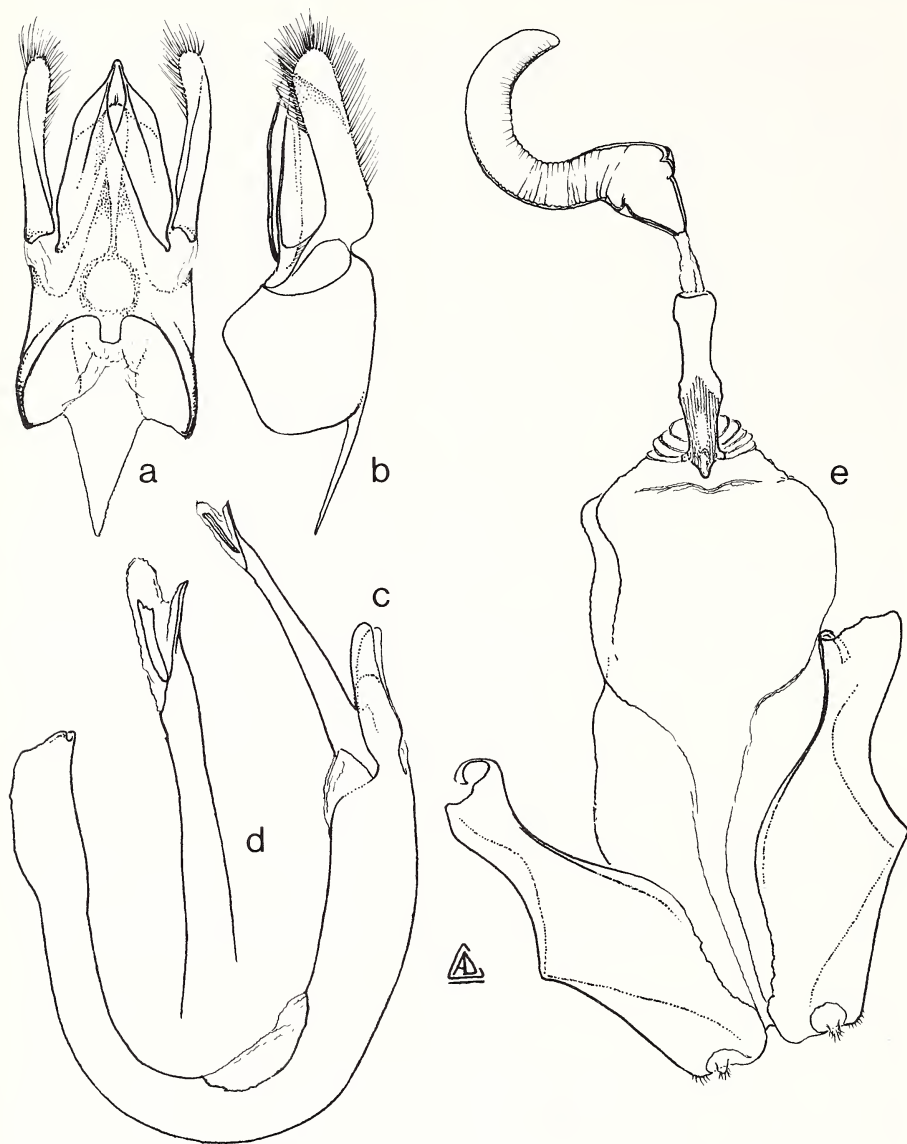


Fig. 598. *Hippodamia glacialis glacialis*.

Type locality. "America boreali."

Type depository. Fabrician collection, Kiel.

Distribution. Figure 600. Quebec to South Carolina and Alabama, west to Saskatchewan and Colorado.

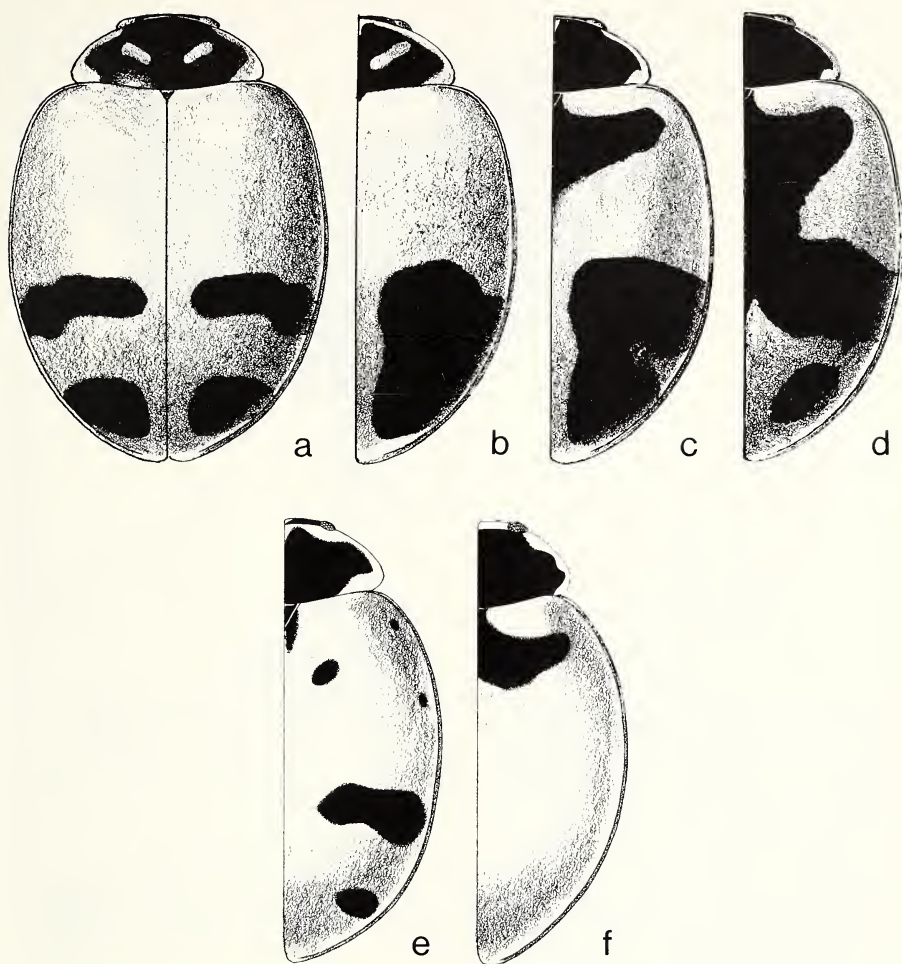


Fig. 599. a, b. *Hippodamia glacialis glacialis*. c–e. *H. g. lecontei*. f. *H. g. extensa*.

Hippodamia glacialis lecontei Mulsant

Fig. 599c–e; Map, Fig. 601

Hippodamia lecontei Mulsant, 1850, p. 1010.—Mulsant, 1866, p. 9.—Crotch, 1873, p. 366.—Casey, 1899, p. 78.—Leng, 1903a, p. 41.—Casey, 1908, p. 396.—Timberlake, 1919, p. 169.—Korschefsky, 1932, p. 341.

Hippodamia quinquesignata var. *lecontei*: Crotch, 1874b, p. 95.

Hippodamia convergens var. *lecontei*: Johnson, 1910, p. 23.—Chapin, 1946, p. 17.

Hippodamia convergens var. *pseudoglacialis* Johnson, 1910, p. 23.—Chapin, 1946, p. 17.

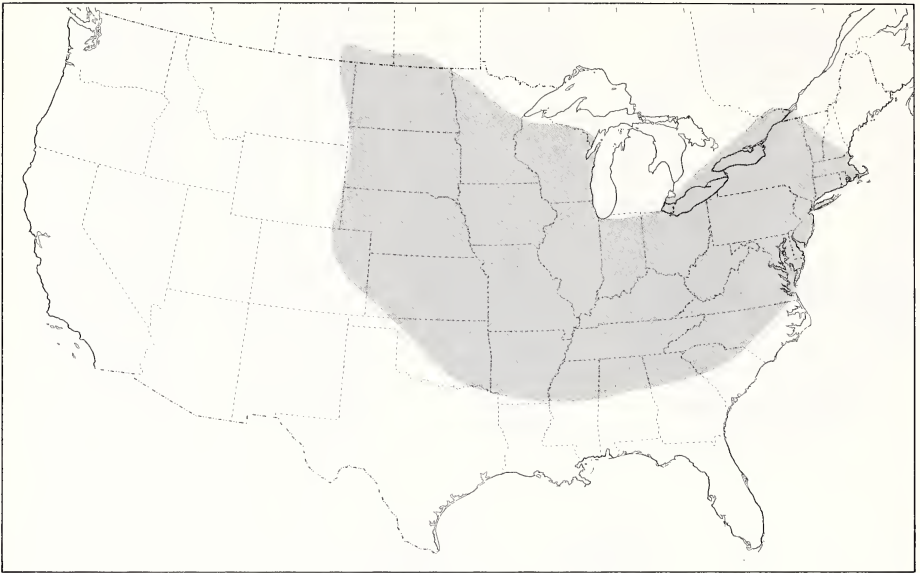


Fig. 600. Distribution. *Hippodamia glacialis glacialis*.

Hippodamia lecontei abducens Casey, 1908, p. 396.—Leng, 1920, p. 216.

Hippodamia convergens var. *defecta* Johnson, 1910, p. 21.—Leng, 1920, p. 216.

Hippodamia hoppingi Nunenmacher, 1934a, p. 21.—Chapin, 1946, p. 21.

Hippodamia glacialis lecontei: Chapin, 1946, p. 18.—Hatch, 1961, p. 173.—Brown and de Ruelle, 1962, p. 651.

Hippodamia glacialis mackenziei Chapin, 1946, p. 19. **New Synonymy.**

Diagnosis. Length 5.0 to 7.0 mm, width 3.60 to 4.70 mm. Pronotum usually without convergent pale spots, or with spots reduced in size; elytron variable but usually with apical black band or spots, some western specimens heavily maculate (Fig. 599c–e). Genitalia as in *H. g. glacialis*.

Discussion. This subspecies is more variable in color pattern than the typical subspecies, and more likely to be confused with other species. The subspecies *H. g. mackenziei* Chapin I consider a junior synonym of *H. g. lecontei* because the *H. mackenziei* color pattern can be found in specimens from Colorado and New Mexico. In addition, specimens from the type locality of *H. mackenziei* vary from heavily maculate (Fig. 599d) to the nearly immaculate appearance of *H. g. extensa*. There are 2 type specimens of *H. hoppingi* in the CAS collection, I here designate and label a male labeled "Mt. Stillman, Tulare Co. Calif./1000 ft. Aug. 3, 1904/Hippodamia hoppingi Nun." as the lectotype.

Type locality. Of *lecontei*, Santa Fe, New Mexico (type locality fixed by Chapin, 1946); of *pseudoglacialis*, New Mexico and northward"; of *hoppingi*, Mt. Stillman, Tulare Co., California (lectotype here designated); of *mackenziei*, Glacier Lodge, Inyo County, California.



Fig. 601. Distribution. *Hippodamia glacialis lecontei* (shaded); *H. g. extensa* (star).

Type depository. Of *lecontei*, MCZ; of *pseudoglacialis*, types not preserved; of *hoppingi*, CAS; of *mackenziei*, USNM (57892).

Distribution. Figure 601. Saskatchewan to New Mexico, west to Alberta and California.

Hippodamia glacialis extensa Mulsant

Fig. 599f; Map, Fig. 601

Hippodamia extensa Mulsant, 1850, p. 17.—Mulsant, 1866, p. 11.—Crotch, 1873, p. 366.—Casey, 1899, p. 79.—Timberlake, 1919, p. 174.—Korschevsky, 1932, p. 340.

Hippodamia quinquesignata var. *extensa*: Crotch, 1874b, p. 95.—Leng, 1903, p. 41.

Hippodamia convergens var. *extensa*: Johnson, 1910, p. 23.

Hippodamia glacialis extensa: Chapin, 1946, p. 19.

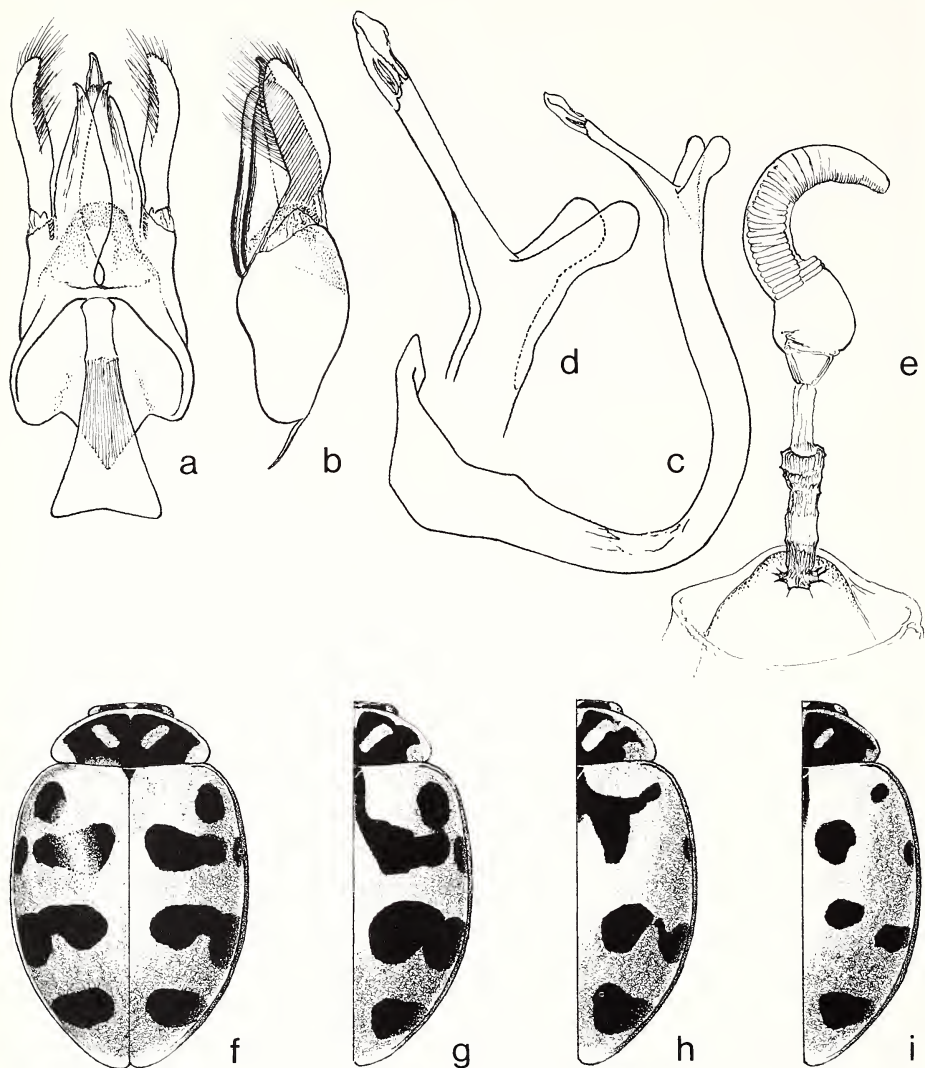


Fig. 602. *Hippodamia quindecimmaculata*.

Diagnosis. Length 5.0 to 7.0 mm, width 3.0 to 4.50 mm. Pronotum without pale convergent spots; elytron immaculate or with basal transverse band (Fig. 599f). Genitalia as in *H. g. glacialis*.

Discussion. I originally assumed that *H. extensa* was simply a junior synonym of *H. lecontei*, but on examination of specimens, *H. extensa* has the apical ridge of the mesosternum strongly reduced while it is normal in *H. g. glacialis* and *g. lecontei*. The dorsal color pattern of *extensa* occurs in populations of *lecontei* and I don't consider that pattern a valid basis for distinguishing subspecies, but on the basis of

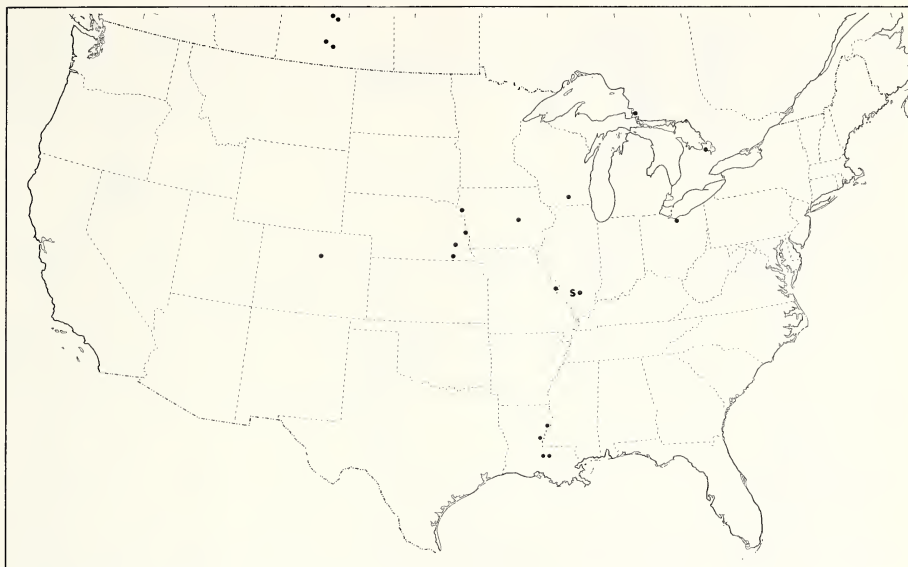


Fig. 603. Distribution. *Hippodamia quindecimmaculata*.

the different structure of the mesasternum, I maintain *extensa* as a subspecies of *glacialis*. The geographic range of *extensa* is the San Francisco bay area of California, a surprisingly restricted range for any species or subspecies of *Hippodamia*, suggesting that something is not correct with the classification proposed.

Type locality. "Californie septentrionale."

Type depository. Type not examined.

Distribution. Figure 601. CALIFORNIA: Alameda Co.

Hippodamia quindecimmaculata Mulsant

Fig. 602a-i; Map, Fig. 603

Hippodamia quindecimmaculata Mulsant, 1850, p. 20.—Mulsant, 1866, p. 12.—Korschefsky, 1932, p. 343.—Chapin, 1946, p. 20.—Wingo, 1952, p. 45.—Brown and de Ruelle, 1962, p. 651.—J. Chapin, 1974, p. 59.

Hippodamia 15-maculata: Crotch, 1873, p. 367.—Crotch, 1874b, p. 95.—Casey, 1899, p. 81.—Timberlake, 1919, p. 169.

Hippodamia convergens 15-maculata: Leng, 1903a, p. 42.—Johnson, 1910, p. 27.

Diagnosis. Length 5.0 to 7.50 mm, width 3.25 to 4.60 mm. Pronotum with convergent pale spots; elytron heavily maculate, spots sometimes feebly confluent (Fig. 602f-i). Male genitalia as in Figure 602a-d. Female genitalia as in Figure 602e.

Discussion. The heavily maculate appearance, strongly developed convergent spots on the pronotum, and geographic range will distinguish most specimens of this species. *H. convergens* is similar in appearance but not as heavily marked and usually smaller.

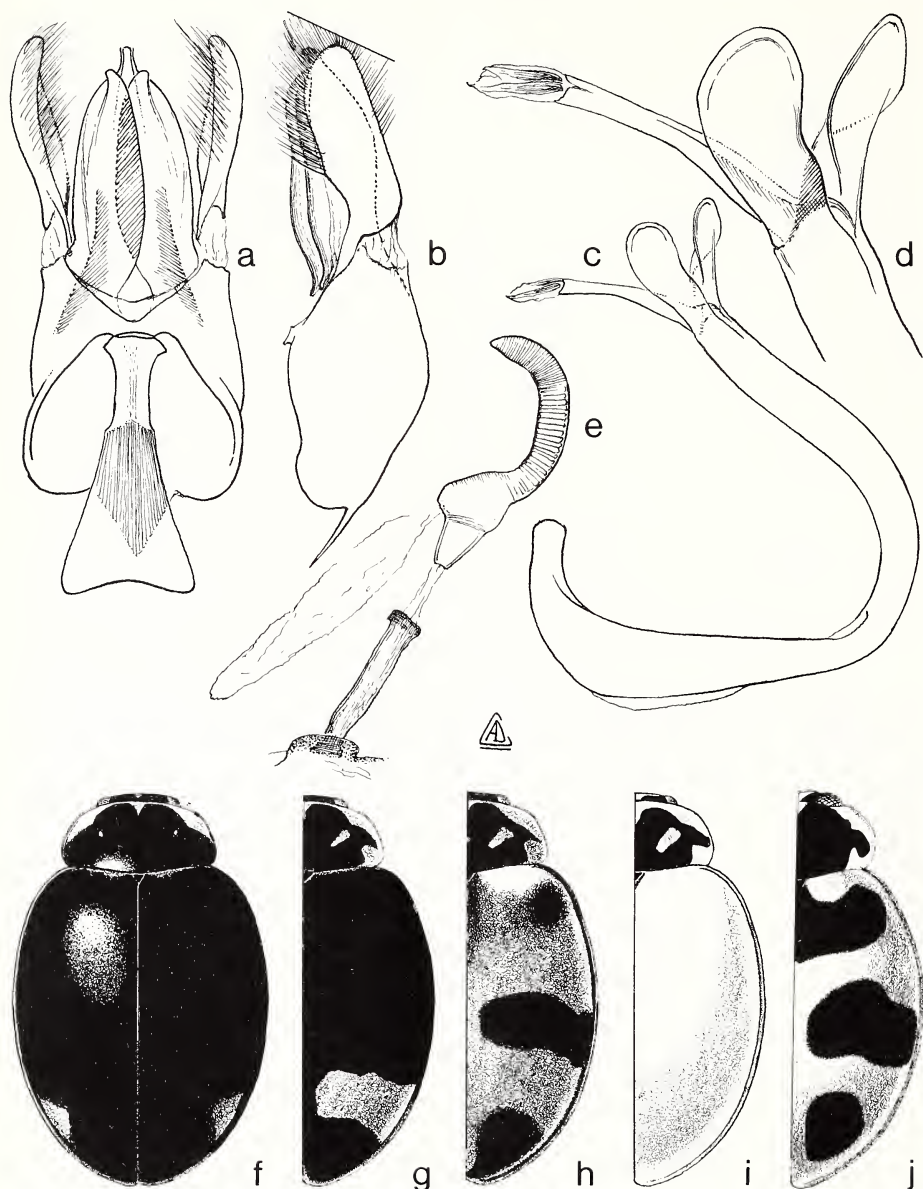


Fig. 604. f, g. *Hippodamia moesta moesta*. h-j. *H. m. bowditchi*. i. *H. m. politissima*.

Type locality. "le bords du Missouri, dans l'Amerique septentrionale".

Type depository. Type not examined.

Distribution. Figure 603. ONTARIO: Batchawang Bay; Grand Bend. SASKATCHEWAN: Carlton; Elbow; Saskatchewan Landing; Saskatoon. Colorado: Denver IL-

LIONIS: "S. Ill.". IOWA: Chelsea; Sioux City. LOUISIANA: Baton Rouge; Concordia Parish; Tensas Parish; West Feliciana Parish. MISSOURI: St. Louis. NEBRASKA: Badger; Elliott; Lincoln; Omaha. OHIO: Sandusky. OKLAHOMA: Durant. WISCONSIN: Madison.

Hippodamia moesta moesta LeConte

Fig. 604a-j; Map, Fig. 605

Hippodamia moesta LeConte, 1854, p. 16.—Crotch, 1874b, p. 97.—Wickham, 1894, p. 305.—Casey, 1899, p. 78.—Leng, 1903a, p. 41.—Timberlake, 1919, p. 170.—Korschefsky, 1932, p. 342.—Belicek, 1976, p. 347.

Hippodamia lecontei var. *moesta*: Crotch, 1873, p. 367.

Hippodamia convergens moesta: Johnson, 1910, p. 45.

Hippodamia moesta moesta: Chapin, 1946, p. 21.—Hatch, 1961, p. 170.—Brown and de Ruette, 1962, p. 652.

Diagnosis. Length 6.0 to 7.50 mm, width 4.0 to 5.20 mm. Pronotum with or without pale dots or convergent spots; elytron usually black with pale spot on elytral margin at apical $\frac{1}{2}$ (Fig. 604f), pattern variable (Fig. 604g) but lateral margin of elytron always black in basal $\frac{2}{3}$. Male genitalia as in Figure 604a-d. Female genitalia as in Figure 604e.

Discussion. The typical form of *H. m. moesta* is the most striking example of *Hippodamia* in North America, but this black form is not constant. I have seen one example in a series of black specimens from Humboldt Co., California, which has the color pattern of *H. m. bowditchi* except that the lateral elytral margin is black in the basal two-thirds. *Hippodamia m. moesta* is a coastal form occurring at low altitudes from southern British Columbia to northern California. Belicek (1976) incorrectly stated that Chapin (1946) had synonymized *H. bowditchi* and *H. politissima* with *H. moesta*. A male of *H. moesta* in the LeConte collection labeled "(blue disc)/Type 6602 (red paper)/*H. moesta* LeC." is here designated and labeled as the lectotype. One additional specimen in the same series, bearing a blue disc, is designated and labeled as a paralectotype.

Type locality. Prairie Paso, Oregon (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 605. BRITISH COLUMBIA: Bevan; Chilliwack; Fraser River, Keremeos; Lillooet; Vancouver Island, Nanaimo. CALIFORNIA: Fort Seward; Humboldt Co., Redwood Creek; Yreka. OREGON: Cherryville; Dilley; Parkdale; Turner. WASHINGTON: Seattle; Mt. Rainier, Longmire Springs; Monroe.

Hippodamia moesta bowditchi Johnson

Fig. 604h-j; Map, Fig. 605

Hippodamia bowditchi Johnson, 1910, p. 45.

Hippodamia moesta bowditchi: Leng, 1920, p. 216.—Chapin, 1946, p. 21.—Hatch, 1961, p. 170.—Brown and de Ruette, 1962, p. 652.

Description as for *H. m. moesta* except elytron yellow with black maculae (Fig. 604h, j).

The dorsal color pattern of *H. bowditchi* is very constant in the specimens ex-

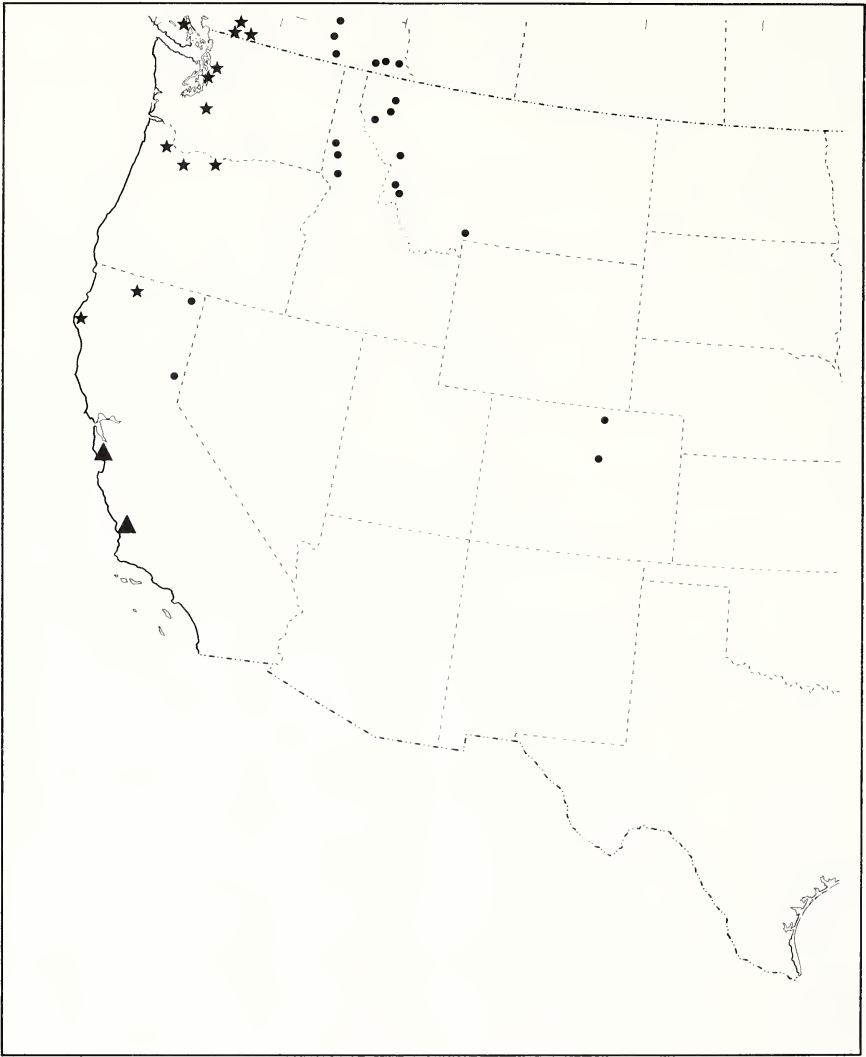


Fig. 605. Distribution. *Hippodamia moesta moesta* (star); *H. m. bowditchi* (dot); *H. m. politissima* (triangle).

amined. The geographic range appears not to overlap that of *m. moesta* or *H. m. politissima* in that I've not seen the color pattern of *H. bowditchi* from any Pacific Coast locality but I have seen 2 California specimens. *Hippodamia bowditchi* occurs in the same region as *H. quinquesignata* and the 2 species have similar color patterns, however, *H. bowditchi* nearly always has the elytral maculae heavy and confluent, *H. quinquesignata* rarely does.

Type locality. St. Maries, Idaho.

Type depository. Type not preserved.

Distribution. Figure 605. BRITISH COLUMBIA: Cawston; Cranbrook; Fernie; Heywood's Corner; Kaslo; Trinity Valley; Vavenby. CALIFORNIA: Modoc Co.; Goose Lake; Plumas Co., Meadow Valley. COLORADO: Denver; Fort Collins. IDAHO: Hayden's Lake. MONTANA: Bitterroot Mts., w. of Thompson Falls; Florence; Gallatin Mts.; Kalispell; Missoula; Ravalli Co., Hamilton; Kalispell; Flathead Co., LaSalle.

Hippodamia moesta politissima Casey

Fig. 604i; Map, Fig. 605

Hippodamia politissima Casey, 1899, p. 80.

Hippodamia ambigua politissima: Leng, 1903a, p. 41.

Hippodamia convergens ab. *politissima*: Korschefsky, 1932, p. 339.

Hippodamia moesta politissima: Chapin, 1946, p. 22.

Description as for *H. m. moesta* except pronotum with distinct, convergent pale spots; elytron immaculate (Fig. 604i).

This subspecies can be separated from the immaculate form of *H. convergens* and *H. q. ambigua* only by examination of genitalia. Thus far *H. politissima* is known only from coastal southern California and I've not seen intergrades with *H. m. moesta*. The type specimen is a male (holotype) in the Casey collection.

Type locality. Santa Cruz, California.

Type depository. USNM (35504).

Distribution. Figure 605. CALIFORNIA: San Luis Obispo.

Hippodamia convergens Guerin

Fig. 606a-i; Map, Fig. 607

Hippodamia convergens Guerin, 1842, p. 321.—Mulsant, 1850, p. 22.—Mulsant, 1866, p. 14.—LeConte, 1852, p. 130.—Crotch, 1873, p. 367.—Crotch, 1874b, p. 96.—Gorham, 1891, p. 153.—Weise, 1895a, p. 135.—Casey, 1899, p. 80.—Leng, 1903a, p. 40.—Casey, 1908, p. 398.—Johnson, 1910, p. 21.—Timberlake, 1919, p. 168.—Korschefsky, 1932, p. 338.—Timberlake, 1943, p. 11.—Chapin, 1946, p. 22.—Wingo, 1952, p. 45.—Hatch, 1961, p. 171.—Brown and de Ruelle, 1962, p. 652.—J. Chapin, 1974, p. 60.—Belicek, 1976, p. 347.

Hippodamia juncta Casey, 1899, p. 80.—Timberlake, 1919, p. 168.—Chapin, 1946, p. 22.

Hippodamia modesta Melsheimer, 1847, p. 178.—LeConte, 1852, p. 130.

Hippodamia convergens var. *obsoleta* Crotch, 1873, p. 367.—Casey, 1908, p. 398.

Hippodamia praticola Mulsant, 1850, p. 23.—Weise, 1895a, p. 125.

Diagnosis. Length 4.20 to 7.30 mm, width 2.50 to 4.90 mm. Pronotum with convergent pale spots; elytron typically with full complement of discrete black spots (Fig. 606f), pattern varying from that to a nearly immaculate form (Fig. 606g-i). Male genitalia as in Figure 606a-d. Female genitalia as in Figure 606e.

Discussion. This is by far the most abundant and widespread species of *Hippodamia*

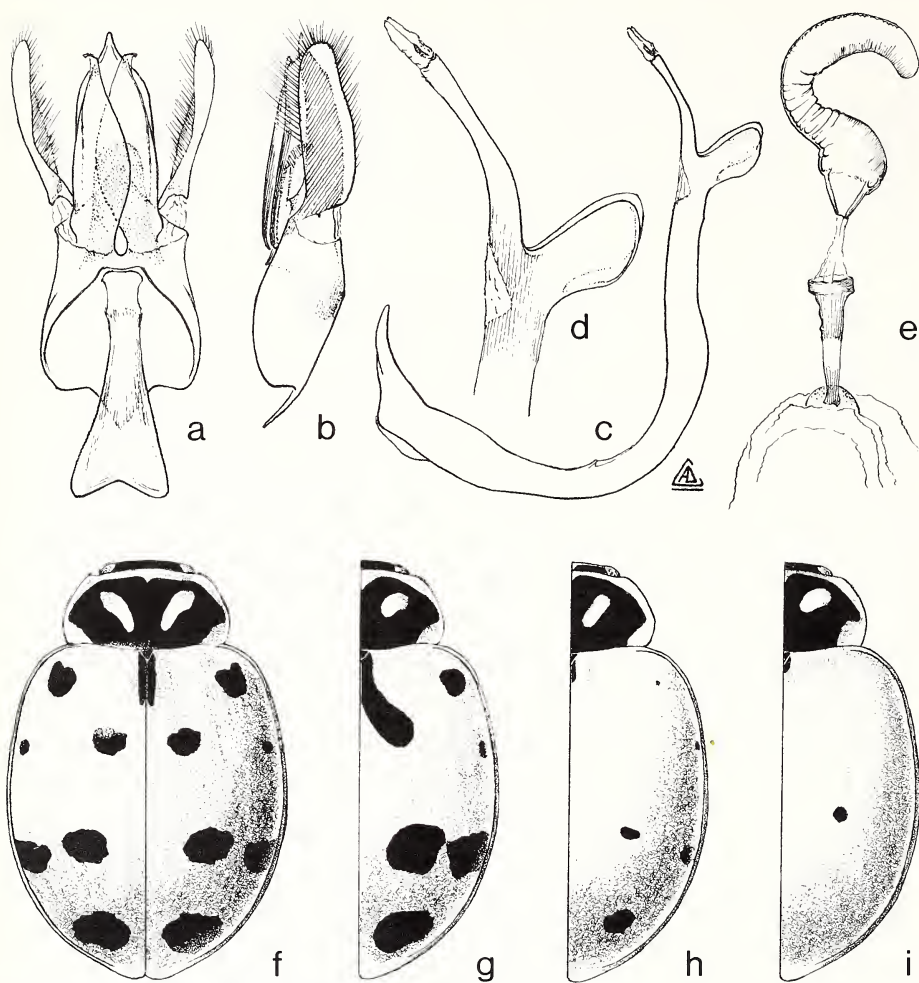


Fig. 606. *Hippodamia convergens*.

in North America. The specimens having the elytral maculation reduced or absent are difficult to recognize without examination of the male genitalia. The normally maculate specimens can usually be recognized without dissection because the elytral spots are small and nearly always discrete, or if confluent, only feebly so. The other species possessing convergent pale spots on the pronotum usually have the elytral spots heavy and with a tendency to coalesce. The range of *H. convergens* is from Ontario and British Columbia to the Antilles and Central and South America. The unique type (holotype) of *juncta* is a male in the Casey collection.

Type locality. Of *convergens*, Mexico and California; of *juncta*, Healdsburg, Sonoma Co., California; of *modesta*, Pennsylvania; of *obsoleta*, not stated; of *praticola*, not stated.



Fig. 607. Distribution. *Hippodamia convergens*.

Type depository. Of *convergens*, UCCC; of *juncta*, USNM (35505); of *modesta*, type not examined; of *obsoleta*, type not examined; of *praticola*, type not examined.

Distribution. Figure 607. Entire United States, northern most Canadian records from southern Ontario, northern Manitoba, and southern British Columbia.

Hippodamia caseyi Johnson

Fig. 608a-g; Map, Fig. 609

Hippodamia caseyi Johnson, 1910, pp. 21, 33.—Casey, 1911, p. 250.—Casey, 1924, p. 155.—Chapin, 1946, p. 24.—Hatch, 1961, p. 170.—Brown and de Ruette, 1962, p. 652.—Belicek, 1976, p. 348.

Hippodamia lecontei ab. *caseyi*: Leng, 1920, p. 216.—Korschefsky, 1932, p. 342.

Diagnosis. Length 4.80 to 6.70 mm, width 2.80 to 4.30 mm. Pronotum with or without convergent pale spots, if present, then usually reduced to dots or small,

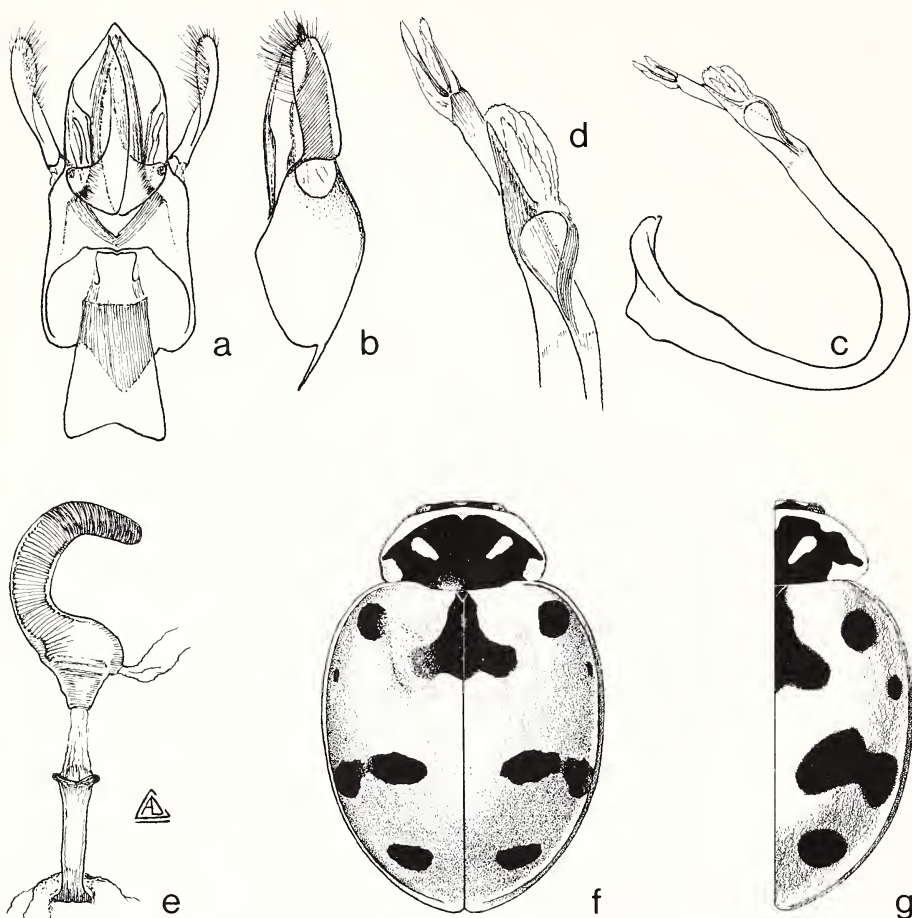


Fig. 608. *Hippodamia caseyi*.

elongate spots, black discal macula extended to, or nearly to, lateral border medially; elytron with maculation as in *H. g. lecontei* (Fig. 608f, g). Male genitalia as in Figure 608a–c. Female as in Figure 608e.

Discussion. This species is very similar to *H. g. lecontei* in color pattern and the 2 species are easily confused. In *H. caseyi* the pale area of the posterolateral angle of the pronotum is usually sharply set off from the other pale pronotal areas by the lateral extension of the discal black spot (*H. m. bowditchi* also has this characteristic). In *H. lecontei* there is a tendency toward this pattern, but the lateral extension of black rarely reaches the pronotal border or even close to it. *Hippodamia caseyi* always has either a subbasal band or elongate scutellar spot on the elytron. *Hippodamia lecontei* may have a subbasal band in some specimens, but never an elongate scutellar spot.

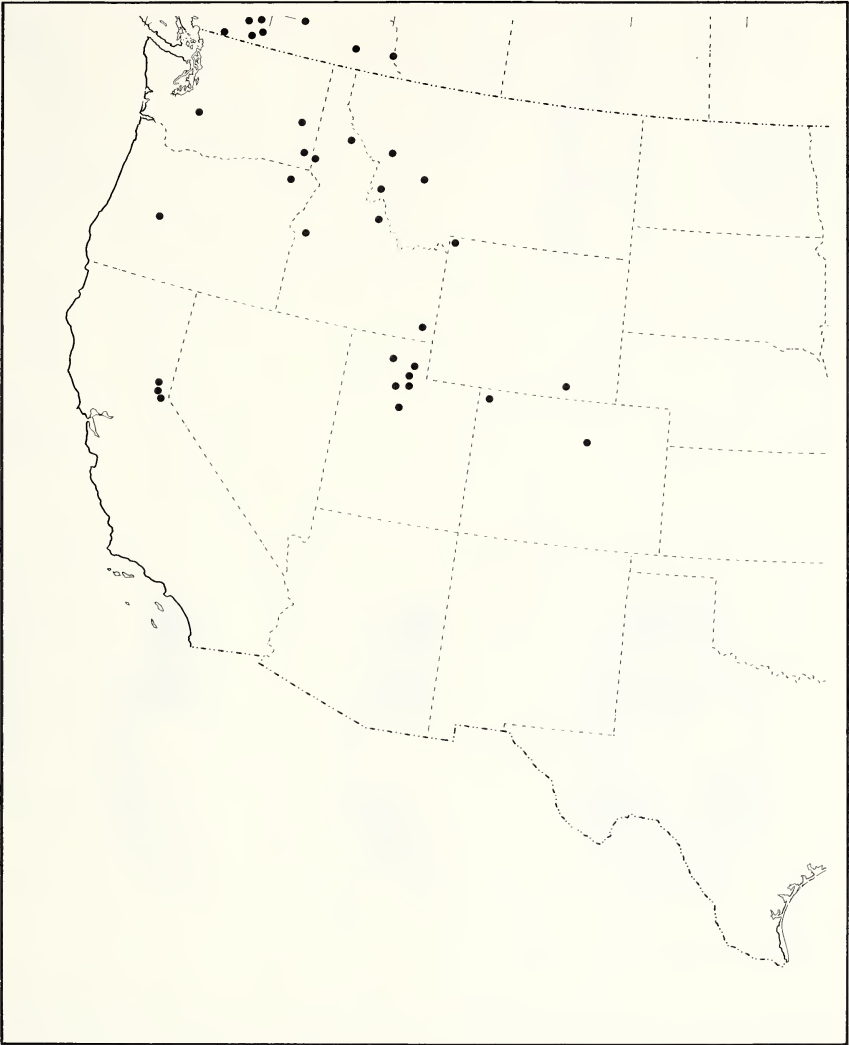


Fig. 609. Distribution. *Hippodamia caseyi*.

Type locality. Fairfield, Washington.

Type depository. Type not designated by author.

Distribution. Figure 609. BRITISH COLUMBIA: Abbotsford; Copper Mt.; Crows-nest Pass; Keremeos; Pavilion; Peters Lake; Yale. CALIFORNIA: Dumont; Eldorado Co., Mt. Tallac; Nevada Co.; Placer Co. COLORADO: Craig; Denver. IDAHO: Emmett; Lemhi Co, Blue Nose Peak; Mica Peak; Moscow, Cedar Mt.; Soda Springs; Wardner. MONTANA: Helena; Missoula, Squaw Peak; Ravalli Co., Deer Mt. OR-EGON: Blue Mts.; Powder Lakes; Unity. UTAH: Alta; Little Baldy Mt.; Ogden; Park

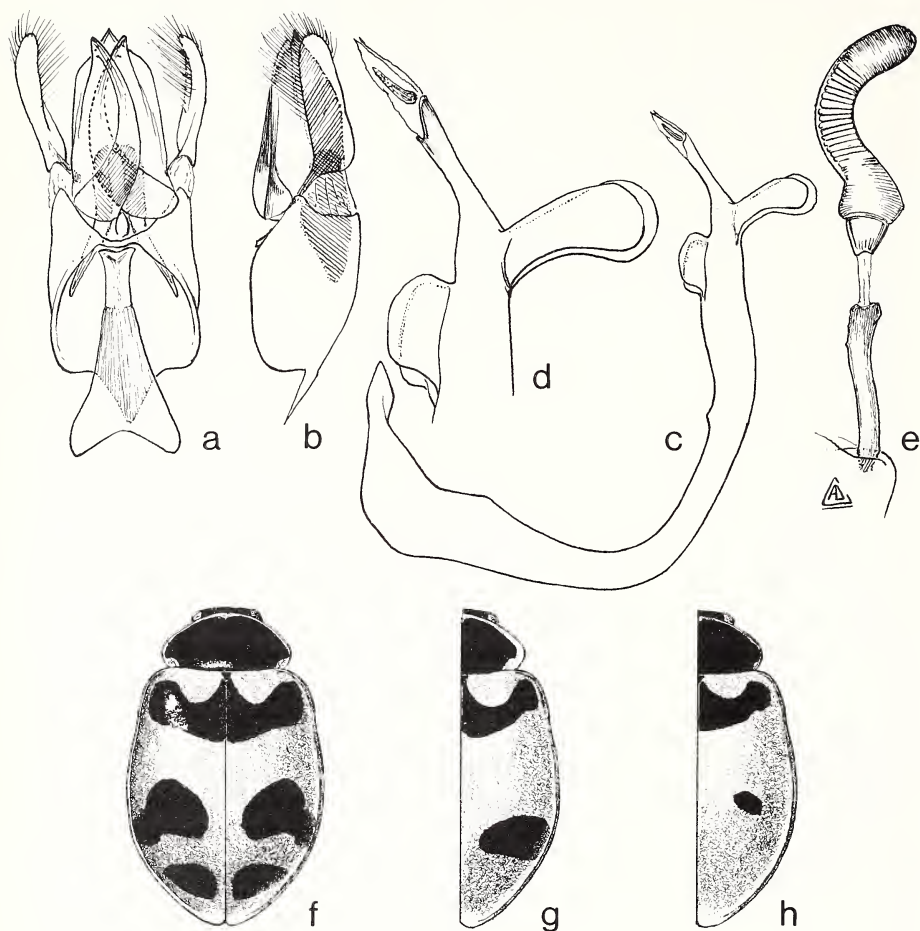


Fig. 610. *Hippodamia oregonensis*.

City; Spanish Fork; Wasatch. WASHINGTON: Pullman; Metaline Falls; Mt. Rainier. WYOMING: Centennial; Yellowstone National Park.

Hippodamia oregonensis Crotch

Fig. 610a-h; Map, Fig. 611

Hippodamia oregonensis Crotch, 1873, p. 367.—Casey, 1899, p. 81.—Leng, 1903a, p. 42.—Casey, 1899, p. 395.—Korschefsky, 1932, p. 343.—Hatch, 1961, p. 170.—Belicek, 1976, p. 348.

Hippodamia oregonensis oregonensis: Chapin, 1946, p. 25.—Brown and de Ruelle, 1962, p. 652.

Hippodamia dispar Casey, 1899, p. 79.—Leng, 1903a, p. 44.—Korschefsky, 1932, p. 340. **New Synonymy.**



Fig. 611. Distribution. *Hippodamia oregonensis* (dot); *H. sinuata sinuata* (star).

Hippodamia oregonensis dispar: Chapin, 1946, p. 25.

Hippodamia puncticollis Casey, 1899, p. 78.—Casey, 1908, p. 397.—Chapin, 1946, p. 24.

Hippodamia 5-signata puncticollis: Leng, 1903a, p. 41.

Hippodamia quinquesignata ab. puncticollis: Leng, 1920, p. 216.—Korschefsky, 1932, p. 344.

Hippodamia liliputana Casey, 1908, p. 397.—Chapin, 1946, p. 25.

Hippodamia quinquesignata liliputana: Korschefsky, 1932, p. 344.

Hippodamia liliputana: Casey, 1910, p. 109 (emendation).—Chapin, 1946, p. 25.

Hippodamia cockerelli Johnson, 1910, p. 49.—Timberlake, 1919, p. 167. **New Synonymy.**

Hippodamia oregonensis cockerelli: Chapin, 1946, p. 26.

Diagnosis. Length 4.0 to 5.0 mm, width 2.70 to 3.60 mm. Pronotum mostly black, lateral and apical borders narrowly yellow, an occasional specimen with minute trace

of convergent pale spots; elytron with black spots heavy with tendency to coalesce (Fig. 610f-h). Male genitalia as in Figure 610a-d. Female genitalia as in Figure 610e.

Discussion. The small size, nearly all black pronotum without convergent pale spots, and heavy elytral maculation usually will allow *H. oregonensis* to be recognized without dissection. Chapin (1946) preserved *H. dispar* and *H. cockerelli* as subspecies of *H. oregonensis*, but I regard them as junior synonyms. This is a high altitude species and as such is likely to exhibit varying degrees of melanism. It is presently rare in collections, but when enough specimens from critical localities become available, I judge that the variation in elytral pattern previously used to segregate subspecies will prove to be useless. The types of *H. dispar* (female), *H. puncticollis* (female), and *H. lilliputana* (male), are all uniques (holotypes) in the Casey collection. The type (male holotype) of *H. cockerelli* is also unique as designated by Johnson.

Type locality. Of *oregonensis*, Oregon; of *dispar*, Colorado; of *puncticollis*, "Canadian Rocky Mts."; of *lilliputana*, Colorado; of *cockerelli*, Sangre de Cristo Range, Cottonwood Gulch, Saguache Co., Colorado.

Type depository. Of *oregonensis*, type not located; of *dispar* (35496), *puncticollis* (35497), *lilliputana* (35498), and *cockerelli* (21557), USNM.

Distribution. Figure 611. ALBERTA: Banff National Park. BRITISH COLUMBIA: Kelowna; Mara; Mt. Revelstoke Park; Mt. Todd; Vancouver; Vancouver Island. COLORADO: Delta Co.; Gothic; Leavenworth Valley; Loveland Pass; Ouray; Rabbit Ears Pass; Rocky Mt. Nat. Park; Silverton. OREGON: Mt. Hood. UTAH: Silverlake; Wasatch Mts. WASHINGTON: Mt. Rainier, Paradise Park; Mt. Yakima; Olympic Mts.

Hippodamia sinuata sinuata Mulsant

Fig. 612a-f, Map, Fig. 611

Hippodamia sinuata Mulsant, 1850, p. 1011.—Crotch, 1873, p. 367.—Crotch, 1874b, p. 96.—Casey, 1899, p. 81.—Leng, 1903a, p. 42.—Casey, 1908, p. 398.—Johnson, 1910, p. 50.—Korschefsky, 1932, p. 344.—Hatch, 1961, p. 169.—Belicek, 1976, p. 349.

Hippodamia sinuata sinuata: Timberlake, 1919, p. 165.—Chapin, 1946, p. 27.

Hippodamia interrogans Mulsant, 1856, p. 139.—Leng, 1920, p. 215.

Hippodamia trivittata Casey, 1899, p. 80.—Korschefsky, 1932, p. 345.—Chapin, 1946, p. 27.

Diagnosis. Length 4.30 to 5.80 mm, width 2.40 to 3.70 mm. Pronotum always with convergent pale spots; elytron with suture narrowly black from base to apical $\frac{3}{4}$, a broad discal vitta extending from near base nearly to apex (Fig. 612f). Male genitalia as in Figure 612a-d. Female genitalia as in Figure 612e.

Discussion. The uniformly vittate appearance and restricted distribution render this subspecies one of the most easily recognized *Hippodamia*. The broad discal vitta on the elytron shows no tendency to break up as does that vitta in specimens of *H. s. crotchii* from Arizona and New Mexico. The type of *H. trivittata* is a unique (holotype) male in the Casey collection. Belicek (1976) incorrectly stated that Chapin (1946) had synonymized *H. spuria* LeConte and *H. crotchii* Casey with *H. sinuata* Mulsant.

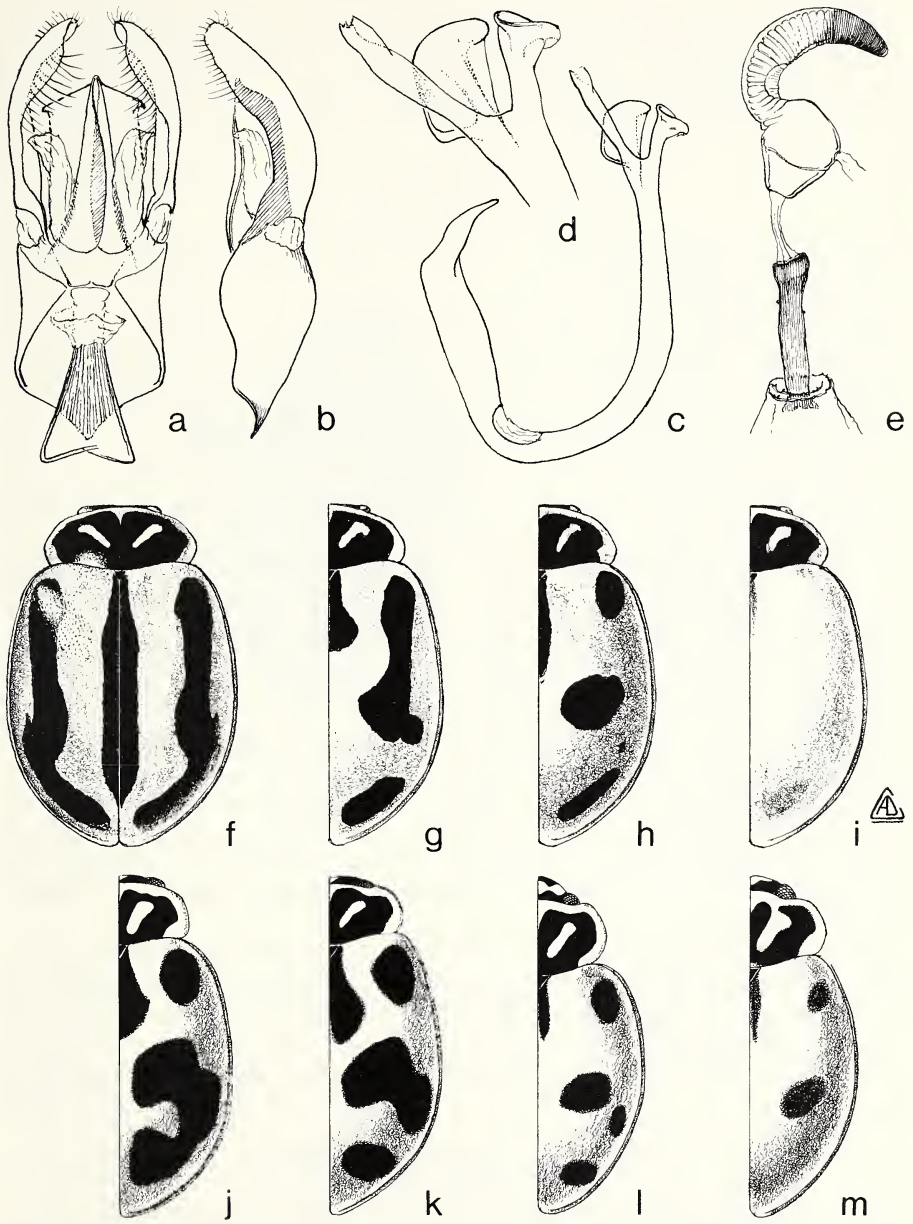


Fig. 612. f. *Hippodamia sinuata sinuata*. g-i. *H. s. crotchii*. j-m. *H. s. spuria*.

Type locality. Of *sinuata*, California; of *trivittata*, Sonoma Co., California.

Type depository. Of *sinuata*, type not examined; of *trivittata*, USNM (35512).

Distribution. Figure 611. CALIFORNIA: Alameda Co.; Antelope Valley; Benecia; Birds Landing; Dos Palos; Gilroy; Guadeloupe; Lancaster; Los Angeles; Martinez; San Jose; Santa Clara; Contra Costa Co.; Vine Hill; Willows.

Hippodamia sinuata crotchii Casey

Fig. 612g-i; Map, Fig. 613

Hippodamia crotchii Casey, 1899, p. 80.—Casey, 1908, p. 399.—Timberlake, 1919, p. 168.—Korschefsky, 1932, p. 345.

Hippodamia sinuata crotchii: Chapin, 1946, p. 28.

Hippodamia americana fontinalis Casey, 1924, p. 156.—Chapin, 1946, p. 27.

Hippodamia sinuata disjuncta Timberlake, 1919, p. 168.—Chapin, 1946, p. 28.—

Hatch, 1961, p. 169.—Brown and de Ruette, 1962, p. 652. **New Synonymy.**

Hippodamia sinuata straminea Chapin, 1946, p. 29. **New Synonymy.**

Hippodamia sinuata Belicek, 1976, p. 349 (in part) (not *sinuata* Mulsant).

Description as for *H. s. sinuata* except elytron varies from the typical form with broken discal vitta (Fig. 612g) to an immaculate form (Fig. 612h, i).

The typically vittate form of *H. crotchii* is easily recognized, but the remaining phenotypes are readily confused with *H. convergens* and small examples of other species possessing strong convergent pronotal spots. I am placing *H. s. disjuncta* as a junior synonym of *H. s. crotchii* because it is not possible to separate the 2 forms over a broad area encompassing most of Utah and Colorado. Both forms and their intergrades occur within one local population. *Hippodamia s. straminea* is based on teneral specimens of *H. crotchii*. One of the localities of the type series is Fortuna, California; I have seen 2 specimens collected on the same date and at the same place, obviously part of the same series, which are fully mature and marked. Also, as mentioned by Chapin, some paratypes of *H. s. straminea* have indistinct markings, therefore I consider *H. s. straminea* a junior synonym of *H. s. crotchii*. *Hippodamia crotchii* and *H. fontinalis* are represented by unique types (male, female) in the Casey collection.

Type locality. Of *crotchii*, Lake Co., California; of *fontinalis*, Jemez Springs, New Mexico; of *disjuncta*, Murray, Utah; of *straminea*, Klamath River, California.

Type depository. Of *crotchii* (35509), *fontinalis* (35508), *disjuncta* (53932), and *straminea* (57893), USNM.

Distribution. Figure 613. Northwest Territories south to New Mexico and California.

Hippodamia sinuata spuria LeConte

Fig. 612j-m; Map, Fig. 613

Hippodamia spuria LeConte, 1861, p. 358.—Mulsant, 1866, p. 15.—Crotch, 1873, p. 367.—Crotch, 1874b, p. 96.—Casey, 1899, p. 80.—Casey, 1908, p. 399.—Johnson, 1910, p. 50.—Belicek, 1976, p. 349.

Hippodamia sinuata var. *spuria*: Leng, 1903a, p. 42.

Hippodamia sinuata ab. *spuria*: Korschefsky, 1932, p. 345.

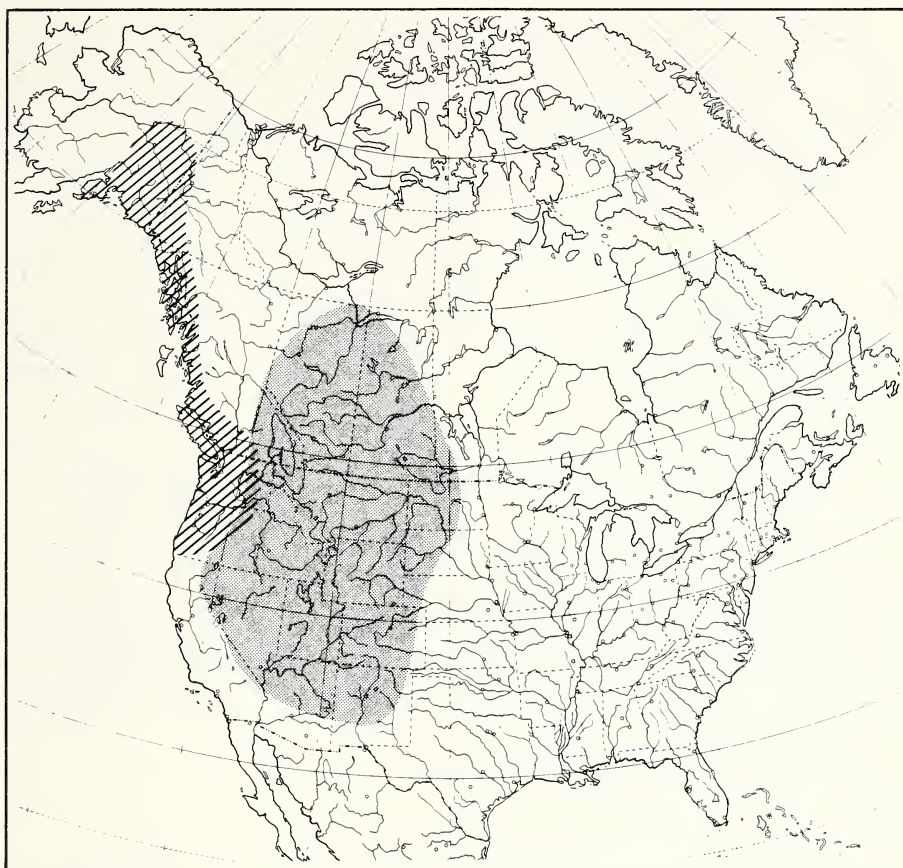


Fig. 613. Distribution. *Hippodamia sinuata crotchii* (shaded); *H. s. spuria* (cross hatch).

Hippodamia sinuata spuria: Timberlake, 1919, p. 165.—Chapin, 1946, p. 28.—Hatch, 1961, p. 169.—Brown and de Ruelle, 1962, p. 652.

Hippodamia complex Casey, 1899, p. 80.—Chapin, 1946, p. 27.

Hippodamia spuria var. *complex*: Timberlake, 1919, p. 168.

Hippodamia spuria ab. *complex*: Korschefsky, 1932, p. 345.

Description as for *s. sinuata* except elytron with heavy black spots varying from completely discrete to strongly coalescent (Fig. 612j–m).

This subspecies is restricted mostly to the coastal areas from Alaska to Oregon. No other species occurring in that region has the heavily maculate pattern of *H. s. spuria*. *Hippodamia l. dobzhanskyi* has a similar elytral pattern, but lacks the convergent pronotal spots. *Hippodamia convergens* has the pronotal spots, but the elytral maculation is not heavy and specimens are usually larger. The type of *complex* Casey is a unique (holotype) specimen in the Casey collection. A male of *spuria* in the

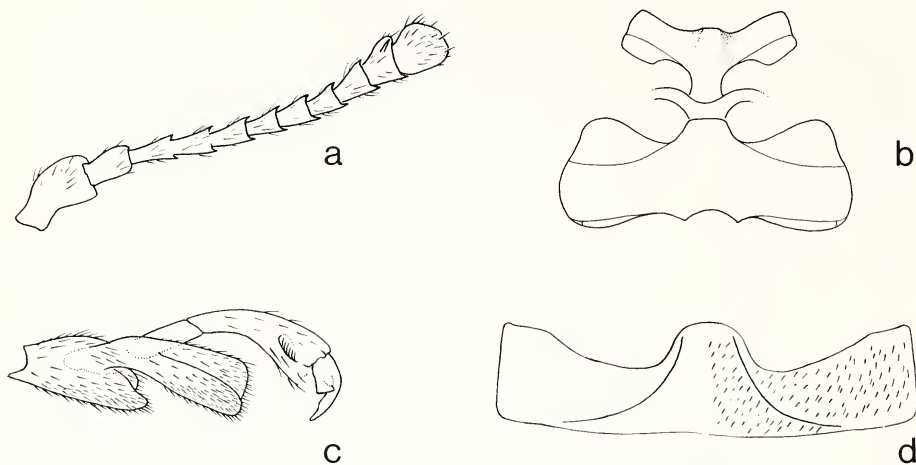


Fig. 614. *Anatis* sp. a. a. Antenna. b. Prosternum, mesosternum, and metasternum. c. Tarsus. d. Postcoxal lines.

LeConte collection labeled "(blue disc)/Type 6683(red paper)/*H. spuria* LeC." is here designated and labeled as the lectotype. Three additional specimens in the same series, each bearing a blue disc, are designated and labeled as paralectotypes.

Type locality. Of *spuria*, Oregon (lectotype here designated); of *complex*, Victoria, Vancouver Island, British Columbia.

Type depository. Of *spuria*, MCZ; of *complex*, USNM (35510).

Distribution. Figure 613. Alaska to Oregon.

Genus *Anatis* Mulsant

Anatis Mulsant, 1846, p. 133.—Mulsant, 1850, p. 132.—Crotch, 1873, pp. 364, 374.—Crotch, 1874b, p. 124.—Casey, 1899, p. 97.—Blatchley, 1910, p. 516.—Korschefsky, 1932, p. 547.—McKenzie, 1936, p. 264.—Wingo, 1952, p. 23.—Watson, 1956, p. 3.—J. Chapin, 1974, p. 68.—Belicek, 1976, p. 322.—Watson, 1976, p. 935.—Iablokoff-Khnzorian, 1982, p. 303. Type-species; *Coccinella ocellata* L., by monotypy.

Myzia LeConte, 1852, pp. 130, 132 (in part).

Coccinellini with form oval, strongly to weakly convex (Fig. 616a). Antennal club with 9th and 10th segments obtriangular in contrast to cylindrical 8th segment (Fig. 614a). Margin of elytron variably explanate, subangulate or rounded in front of middle; apex of elytral suture with distinct patch of hairs on each side; epipleuron nearly flat, slightly descending externally. Prosternum strongly convex medially, protuberant at apex (Fig. 614b), lateral border thickly margined between coxae. Apical margin of mesosternum deeply, broadly emarginate for reception of prosternal process (Fig. 614b). Apex of middle and hind tibia each with 2 spurs. Tarsal claw with large, subquadrate basal tooth (Fig. 614c). Postcoxal line on first abdominal sternum

incomplete, almost reaching posterior margin (Fig. 614d). Male genitalia symmetrical. Female genitalia with well developed infundibulum.

This genus is not closely similar to any other North American genus of Coccinellidae, and is easily recognized by the key characters. *Anatis* is primarily holarctic with the geographic range extending to northern Mexico in North America. In addition to the 4 nearctic species, 2 species occur in the Palearctic Region. Members of *Anatis* are predators on aphids occurring mostly on coniferous and deciduous trees. Specific host records are; *Acyrtosiphum pisum* (Harris), *Coristoneura pinus* Freeman, *Macrosiphum avenae* (F.), *Myzus cerasi* (F.), *Nearctaphis crataegifoliae* (Fitch), *Periphyllus aceris* (L.), *Phorodon humuli* (Schrank), *Pinus strobi* (Hartig), and *Schizolachnus piniradiatae* (Davidson). The genus has been reviewed taxonomically by Watson (1976), and the key and synonymies presented here have been modified from the latter.

KEY TO SPECIES OF *Anatis*

1. Elytron with lateral border broadly explanate and distinctly angulate in front of middle (Fig. 612a) 2
- Elytron with lateral border weakly explanate, not angulate (Fig. 624a) 3
- 2(1). Elytron without dark spots; pronotum with lateral border black (Fig. 612a) *lecontei* Casey
- Elytron with dark spots; pronotum with pale lateral border (Fig. 619a) *rathvoni* (LeConte)
- 3(1). Dark spots on elytron ringed with white or yellow (Fig. 624a) *mali* (Say)
- Dark spots on elytron never ringed (Fig. 619a) *labiculata* (Say)

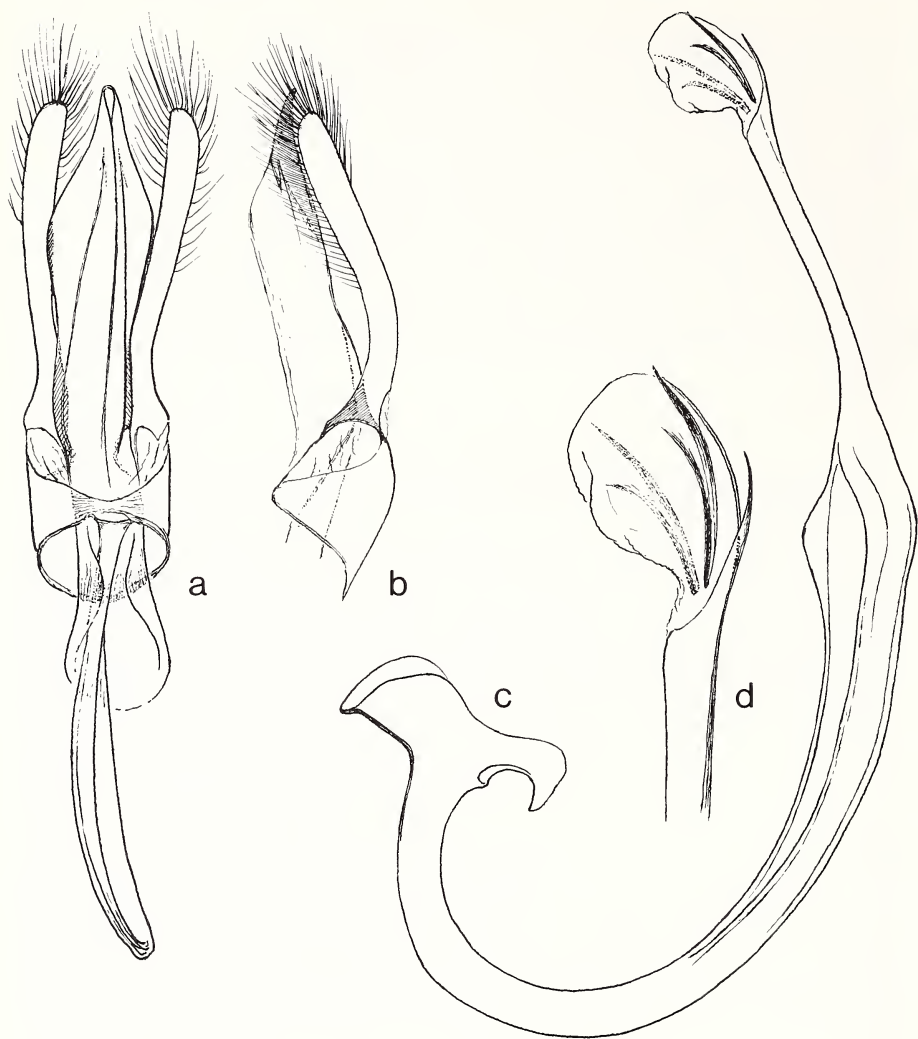


Fig. 615. *Anatis labiculata* (male genitalia).

Anatis labiculata (Say)
Fig. 615a-d, 616a-c; Map, Fig. 617

Coccinella labiculata Say, 1824, p. 288 (in part, var. B).

Coccinella mali Say, 1824, p. 93 (in part, var. b).

Coccinella quindecimpunctata Olivier, 1808, p. 1027 (not *quindecimpunctata* DeGeer, 1775).

Anatis quindecimpunctata: Mulsant, 1850, p. 133.—Crotch, 1874b, p. 124 (in part);

Casey, 1899, p. 98.—Leng, 1903b, p. 207.—Korschevsky, 1932, p. 356.—Mckenzie,

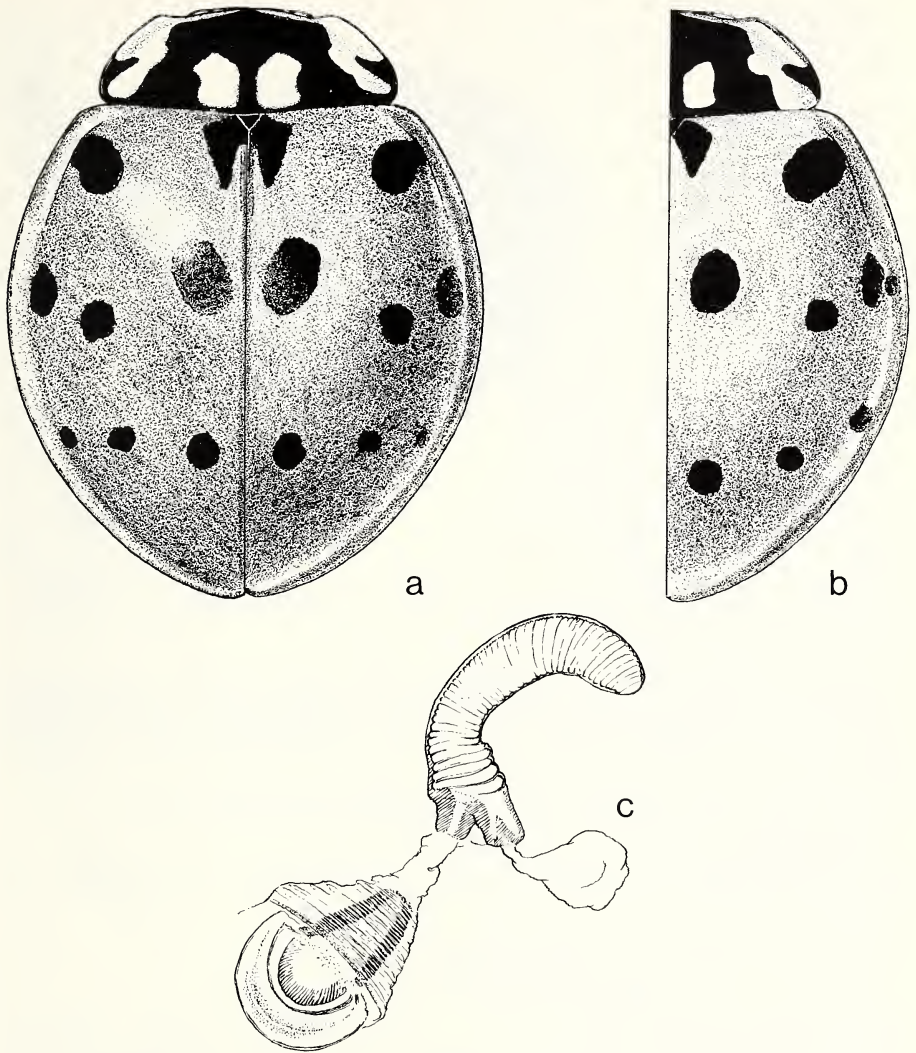


Fig. 616. *Anatis labiculata* (habitus and female genitalia).

1936, p. 268.—Wingo, 1952, pp. 24, 36.—Mader, 1954, p. 125.—J. Chapin, 1974, p. 68.

Mysia quindecimpunctata: Melsheimer, 1853, p. 130 (in part).

Myzia quindecimpunctata: LeConte, 1859c, p. 192 (in part).

Halyzia quindecimpunctata: Gemminger and Harold, 1876, p. 3760 (in part).

Anatis canadensis Provancher, 1877, p. 696.—Horn, 1880, p. xii.

Anatis caseyi Westcott, 1912, p. 422.—Korschefsky, 1932, p. 556.

Anatis labiculata: Watson, 1976, p. 941.

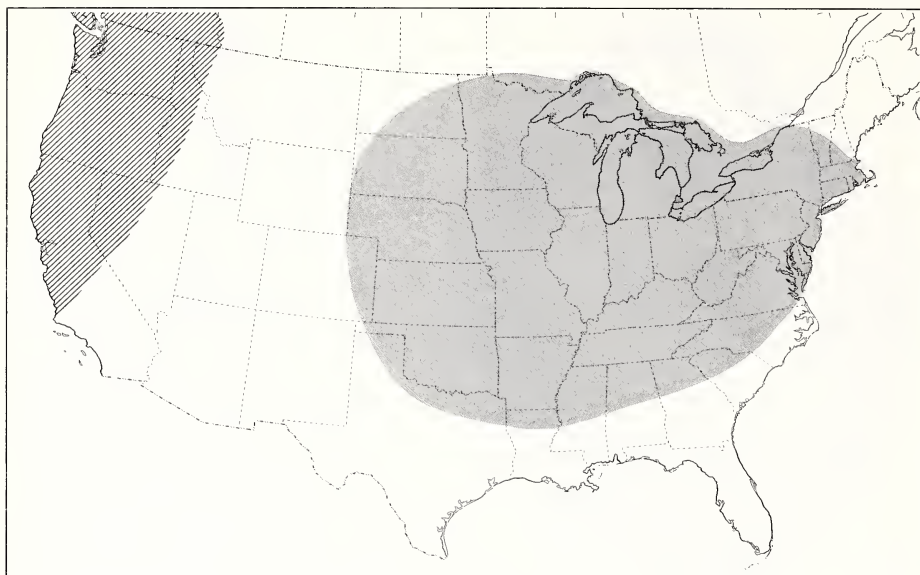


Fig. 617. Distribution. *Anatis labiculata* (shaded); *A. rathvoni* (cross hatch).

Diagnosis. Length 7.20 to 9.50 mm, width 5.50 to 8.0 mm. Form rounded, lateral border of elytron slightly explanate. Color yellow to brownish red with black markings as in Figure 616a, b. Male genitalia as in Figure 615a–d. Female genitalia as in Figure 616c.

Type locality. Simcoe, Ontario (neotype designated by Watson, 1976).

Type depository. CNC.

Distribution. Figure 617. Ontario to South Carolina, west to North Dakota, Colorado and Texas.

Anatis rathvoni (LeConte)

Fig. 618a–d, 619a, b; Map, Fig. 617

Myzia rathvoni LeConte, 1852, p. 132.

Anatis rathvoni: Crotch, 1873, p. 374.—Crotch, 1874b, p. 124.—Wickham, 1894, p. 306.—Casey, 1899, p. 98.—Leng, 1903b, p. 208.—Korschefsky, 1932, p. 557.—McKenzie, 1936, p. 266.—Hatch, 1961, p. 182.—Belicek, 1976, p. 323.—Watson, 1976, p. 942.

Halyzia rathvoni: Gemminger and Harold, 1876, p. 3760.

Diagnosis. Length 7.50 to 10.20 mm, width 6.50 to 9.0 mm. Form elongate, lateral border of elytron strongly explanate. Color yellow to brownish red with black markings as in Figure 619a. Male genitalia as in Figure 618a–d. Female genitalia as in Figure 619b.

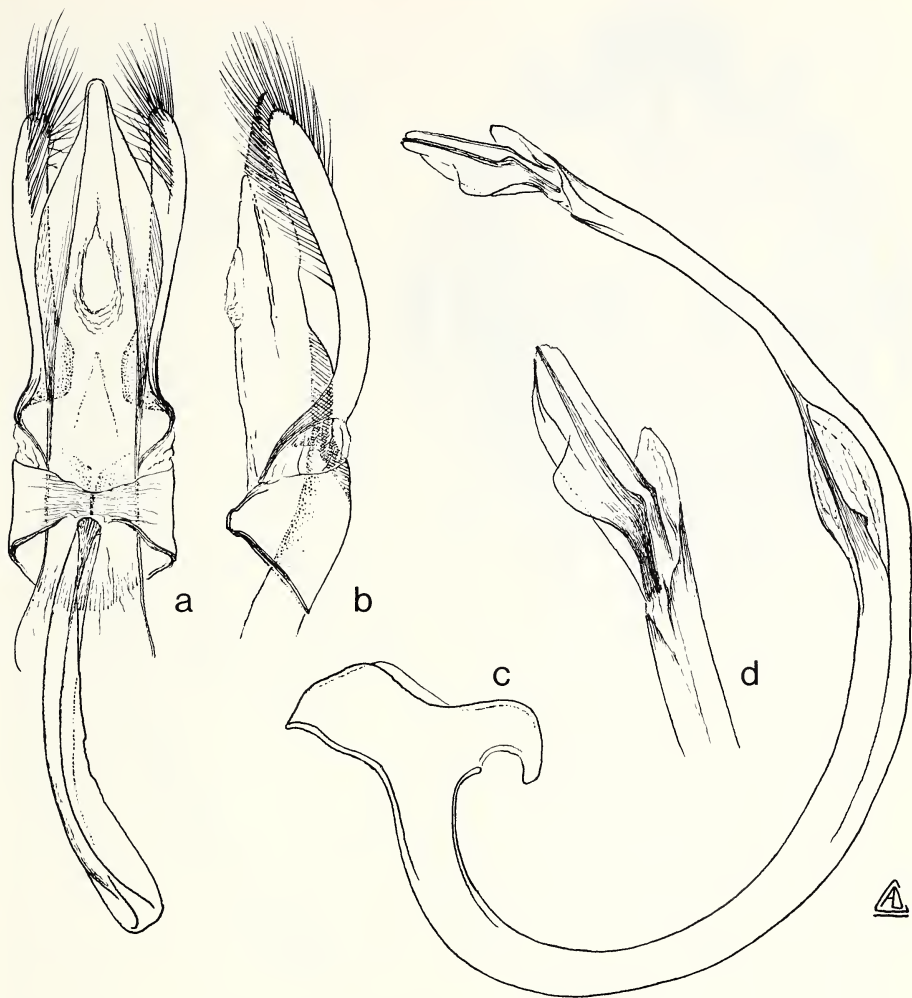


Fig. 618. *Anatis rathvoni* (male genitalia).

Discussion. The type is a unique female (holotype) labeled "(gold disc)/1633/Type 6690 (red paper)/*Myzia rathvoni* Lec."

Type locality. Sacramento, California.

Type depository. MCZ.

Distribution. Figure 617. Southern Alberta to British Columbia, south to northern California.

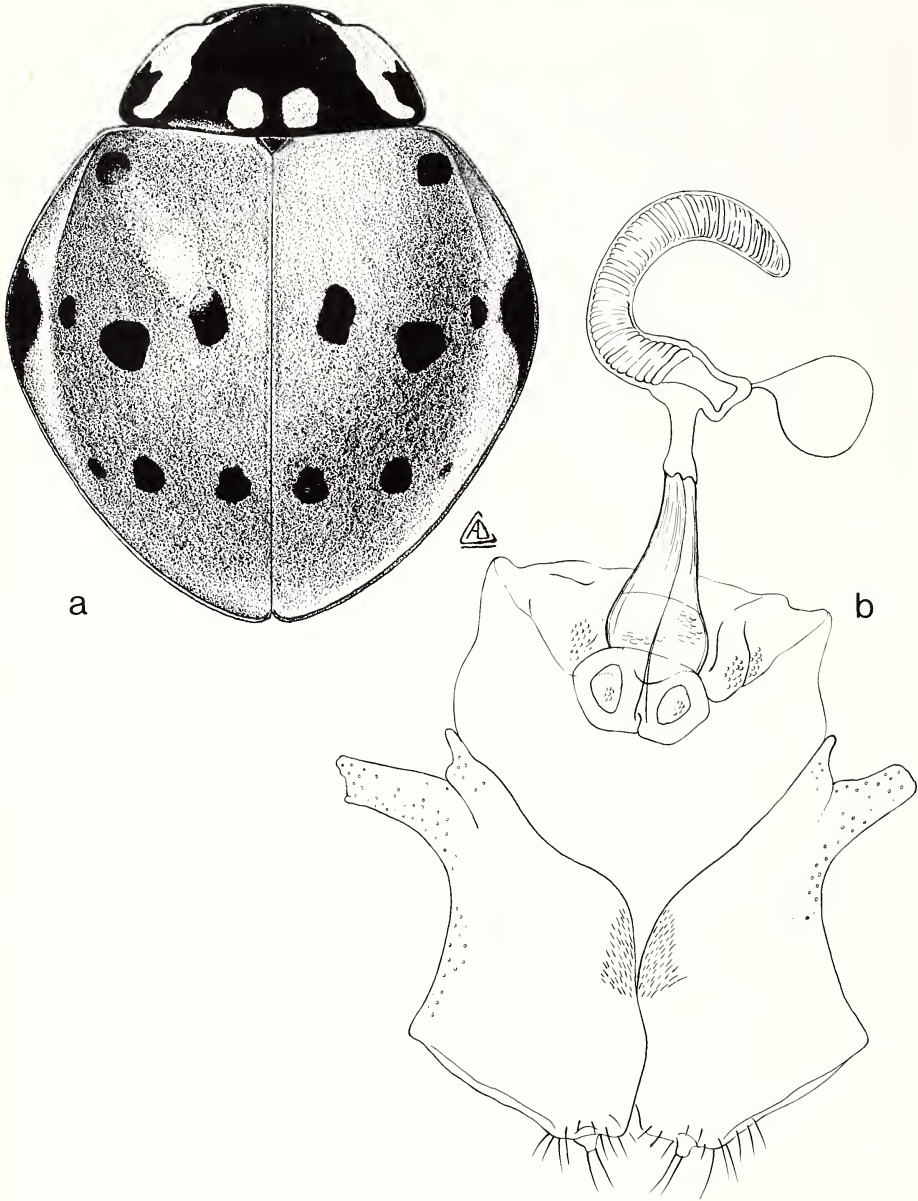


Fig. 619. *Anatis rathvoni* (habitus and female genitalia).

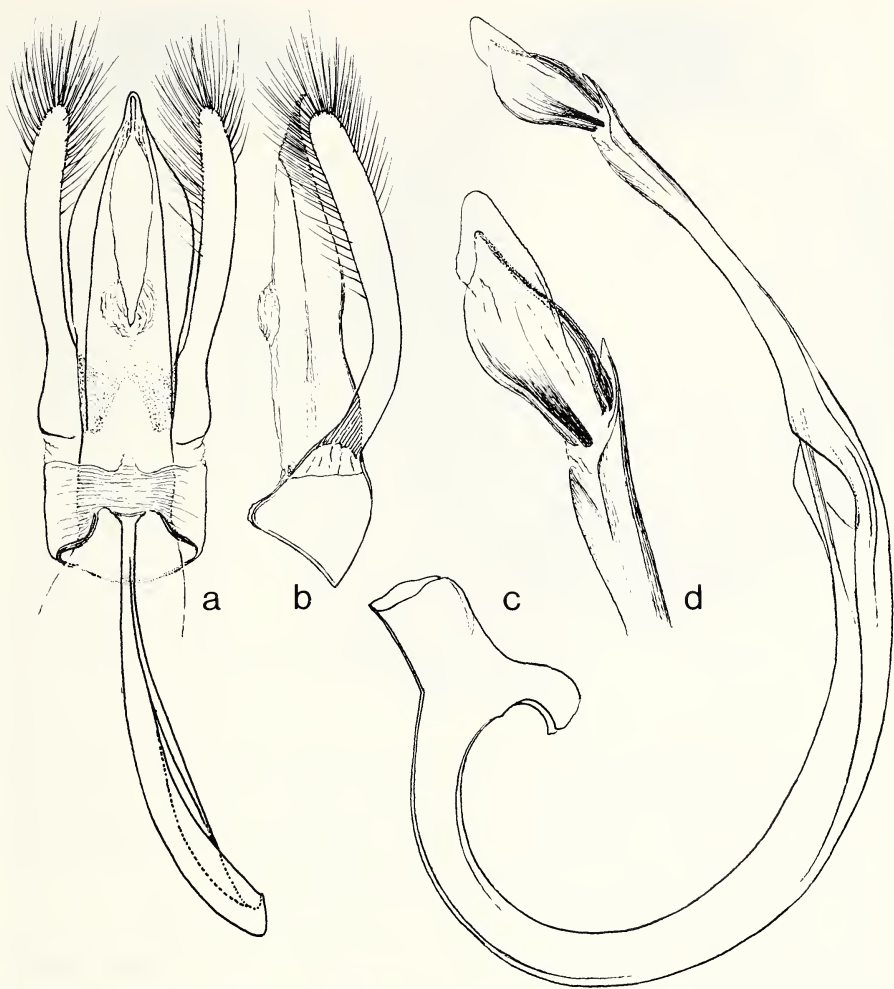


Fig. 620. *Anatis lecontei* (male genitalia).

Anatis lecontei Casey

Fig. 620a-d, 621a-c; Map, Fig. 622

Anatis lecontei Casey, 1899, p. 98.—Casey, 1908, p. 406.—Korschevsky, 1932, p. 547.—Hatch, 1961, p. 183.—Belicek, 1976, p. 323.—Watson, 1976, p. 943.

Anatis rathvoni lecontei: Leng, 1903b, p. 208.—McKenzie, 1936, p. 268.—Wingo, 1952, p. 46.

Diagnosis. Length 7.75 to 10.50 mm, width 6.50 to 9.00 mm. Form elongate, lateral border of elytron strongly explanate. Color yellow to brownish red, pronotum

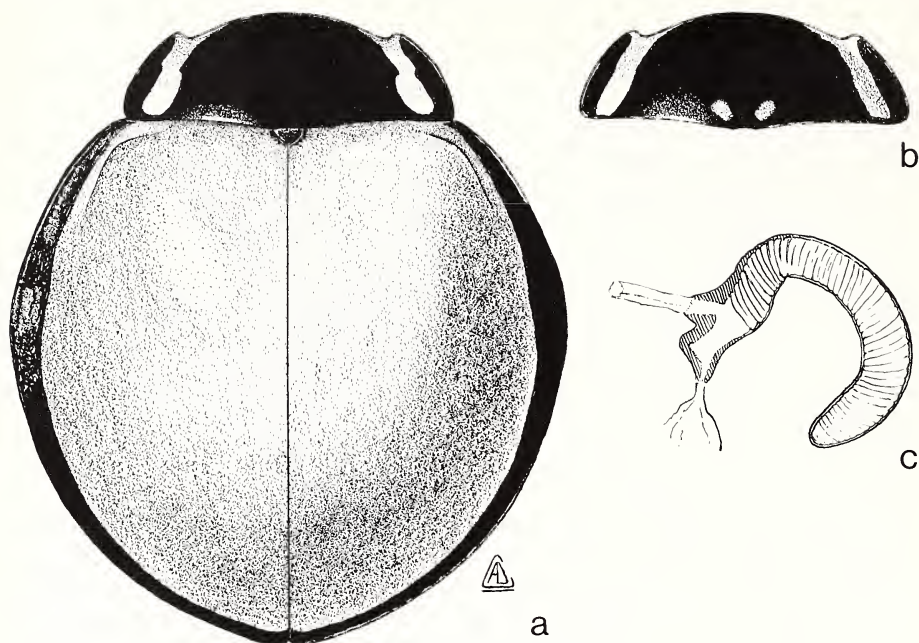


Fig. 621. *Anatis lecontei* (habitus, pronotum, and spermathecal capsule).

often with 2 basal spots (Fig. 621b), elytron without black marking (Fig. 621a). Male genitalia as in Figure 620a–d. Female genitalia as in Figure 621c.

Discussion. There are 3 types of *A. lecontei* in the Casey collection, the first of these, a female, is here designated and labeled as the lectotype, the other 2, from Jemez Springs, New Mexico, are designated as paralectotypes.

Type locality. Fort Wingate, New Mexico (lectotype here designated).

Type depository. USNM (35539).

Distribution. Figure 622. Southern Alberta to New Mexico, west to British Columbia and California.

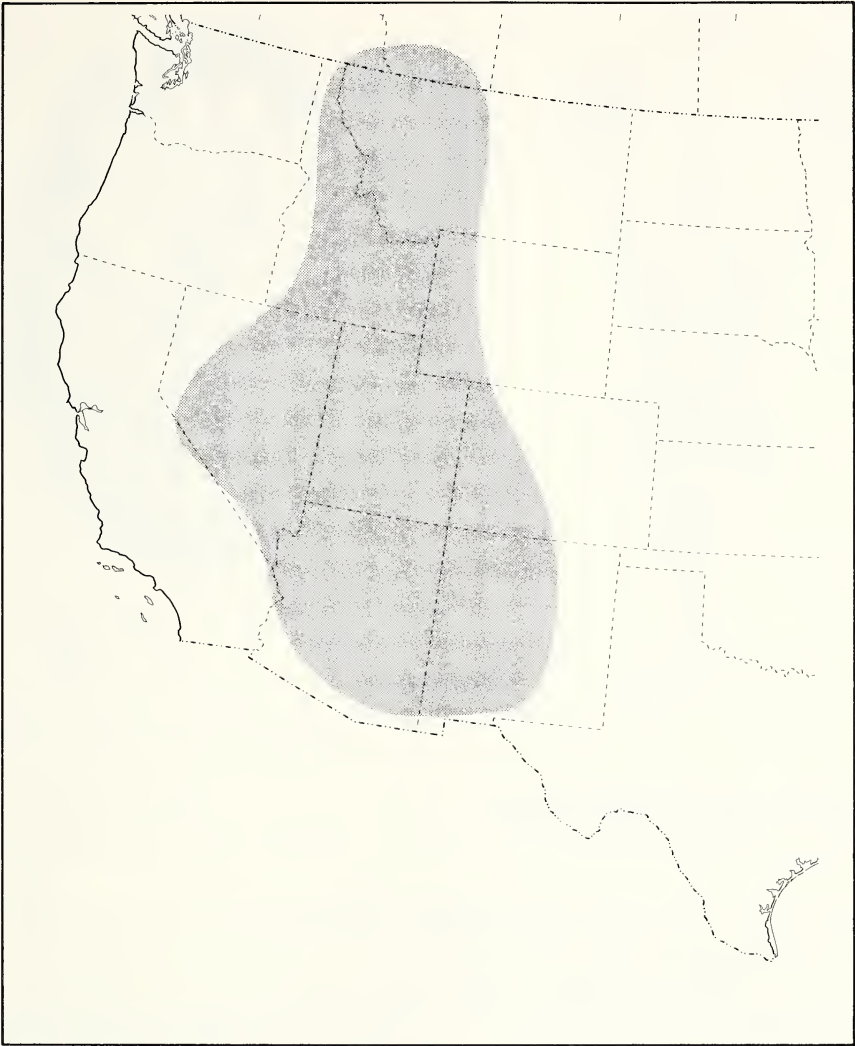


Fig. 622. Distribution. *Anatis lecontei*.

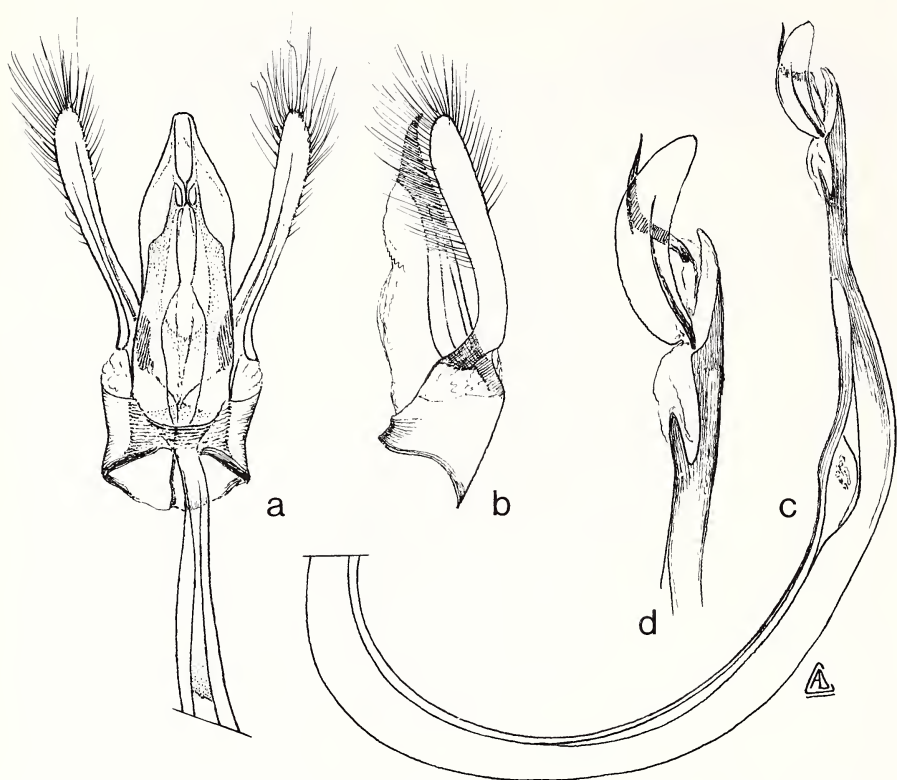


Fig. 623. *Anatis mali* (male genitalia).

Anatis mali (Say)

Fig. 623a-d, 624a, b; Map, Fig. 625

Coccinella mali Say, 1825, p. 93 (in part, var. a.).

Coccinella labiculata Say, 1824, p. 288 (in part, var. a.).

Coccinella quindecimpunctata Olivier, 1808, p. 1027 (not *quindecimpunctata* Degeer, 1775).

Anatis quindecimpunctata var. *mali*: Mulsant, 1850, p. 134.—Leng, 1903b, p. 208.—Blatchley, 1910, p. 517.—Leng, 1920, p. 217.

Anatis signaticollis Mulsant, 1850, p. 134.—Mader, 1954, p. 125.

Mysia 15-punctata: Melsheimer, 1853, p. 130 (in part).

Myzia 15-punctata: LeConte, 1859c, p. 192 (in part).

Anatis quindecimpunctata: Crotch, 1873, p. 374.—Casey, 1899, p. 98.—Westcott, 1912, p. 422.—Korschefsky, 1932, p. 556.—McKenzie, 1936, p. 268.—Wingo, 1952, p. 24.

Halyzia 15-punctata: Gemminger and Harold, 1876, p. 3760 (in part).

Anatis ocellata mali: Hatch, 1961, p. 182.

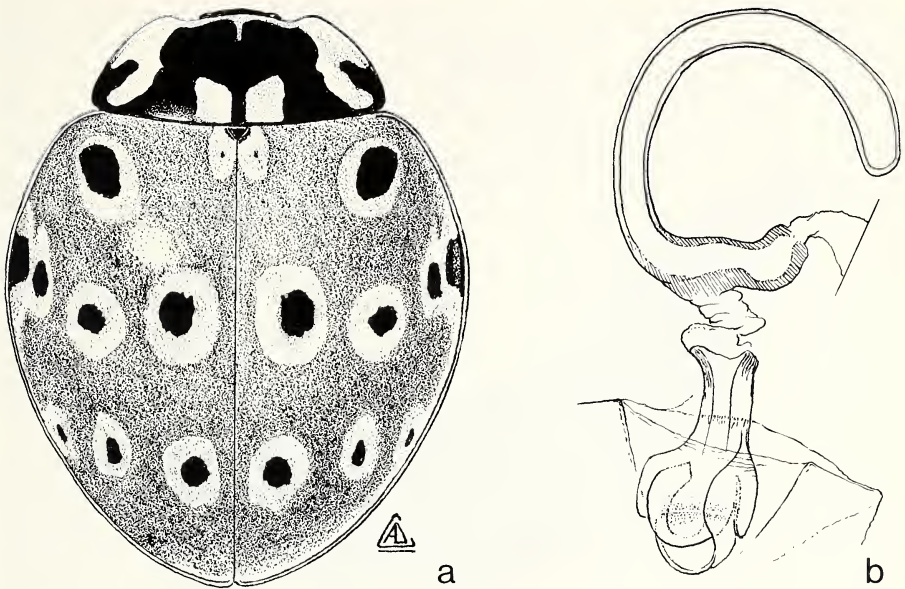


Fig. 624. *Anatis mali* (habitus, female genitalia).

Anatis borealis Belicek, 1976, p. 323. **New Synonymy.**

Anatis mali: Casey, 1899, p. 98.—Watson, 1976, p. 938.

Diagnosis. Length 7.30 to 10.0 mm, width 5.50 to 7.60 mm. Form rounded, lateral border of elytron slightly explanate. Color yellow to brownish red with black markings as in Figure 624a. Male genitalia as in Figure 623a–d. Female genitalia as in Figure 624b.

Discussion. The name *borealis* was proposed because Belicek did not realize that both *A. mali* and *A. labiculata* were available as pointed out by Watson (1976, p. 935). Therefore *A. borealis* is an unnecessary name and must be placed in synonymy.

Type locality. Of *mali*, Little Rapids, Ontario (neotype designated by Watson, 1976); of *borealis*, Edmonton, Alberta.

Type depository. Of *mali*, CNC; of *borealis*, CNC.

Distribution. Figure 625. Ontario to British Columbia, south to Virginia and Oregon.

Genus *Myzia* Mulsant

Myzia Mulsant, 1846, p. 277.—LeConte, 1852, p. 130. Type-species; *Coccinella oblongoguttata* L., by monotypy.

Mysia Mulsant, 1846, p. 129.—Mulsant, 1850, p. 137.—Crotch, 1873, p. 364.—Crotch, 1874b, p. 125.—Gorham, 1892, p. 162.—Wickham, 1894, p. 299 (not *Mysia* Lamarck, 1818).

Neomysia Casey, 1899, p. 98.—Casey, 1905, p. 161.—Casey, 1908, p. 407—Leng,

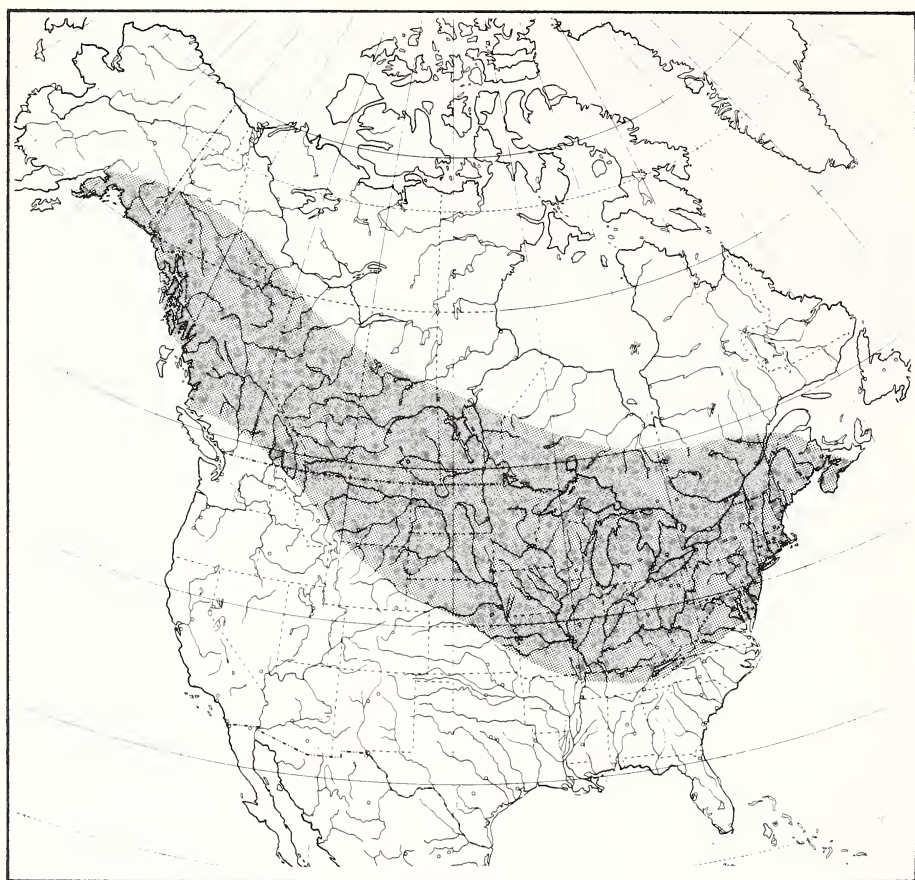


Fig. 625. Distribution. *Anatis mali*.

1903b, p. 194.—Korschefsky, 1932, p. 542.—Timberlake, 1943, p. 21.—Wingo, 1952, p. 23.—J. Chapin, 1974, p. 68.—Belicek, 1976, p. 324. Type-species; *Coccinella oblongoguttata* L. by subsequent designation of Korschefsky, 1932.
Paramysia Reitter, 1911, pp. 136, 144.—Timberlake, 1943, p. 21 (unnecessary replacement name for *Myisia* Mulsant).
Myzia LeConte: Belicek, 1976, p. 324 (error, name cannot be attributed to LeConte).
Sospita (*Myzia*): Iablokoff-Khnzorian, 1982, p. 158.

Coccinellini with length 6.0 to 10.0 mm; form oval, strongly convex. Dorsal color pattern with pale background, elytron immaculate or with dark vittae. Anterolateral angle of clypeus produced forward. Lateral margin of elytron variably explanate, rounded or subangulate in front of middle; epipleuron obliquely descending externally. Intercoxal process of prosternum with strong lateral ridge, median area depressed. Apical margin of mesosternum broadly, feebly emarginate for reception of

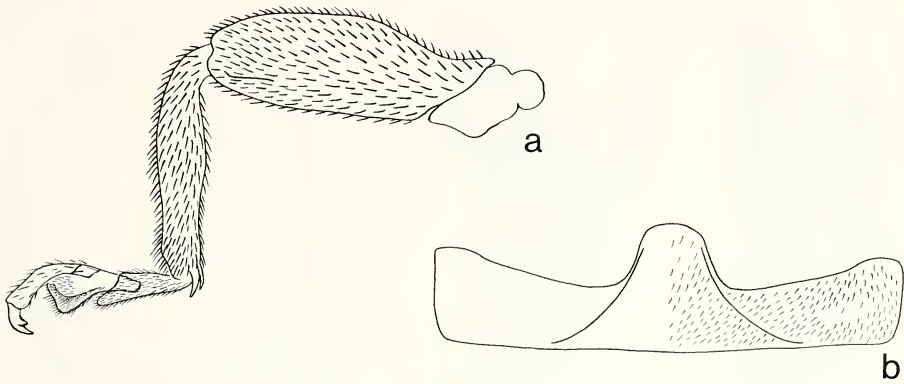


Fig. 626. *Myzia* sp. a. Hind leg. b. Postcoxal lines.

prosternal process. Apex of middle and hind tibia each with 2 spurs. Tarsal claw cleft (Fig. 626a). Postcoxal line incomplete, of *Diomus* type (Fig. 626b). Male genitalia symmetrical. Female genitalia lacking infundibulum; coxal plate short, ovoid, with strong apical stylus (Fig. 628d).

Myzia is easily recognized by the key characters; in addition, the pale dorsal color, usually somewhat vittate elytra, and smooth, polished dorsal surface are characteristic of members of the genus. *Myzia* is primarily holarctic with the geographic range extending to northern Mexico in North America. In addition to the species found in America north of Mexico, 2 occur in the Old World and one in Mexico. Members of *Myzia* are predators on aphids associated with a wide variety of woody plants. Specific host records are *Lachnus pinicola* and *Chermes* sp. The genus was reviewed by Belicek (1976), who reinstated the generic name *Myzia*, placing *Neomysia* as a junior synonym of *Myzia*, a decision with which I agree. Belicek designated *Coccinella pullata* Say as the type-species of *Neomysia*; this action is invalid because Korschefsky (1932) previously designated *Coccinella oblongoguttata* L. as the type-species. Timberlake (1943) regarded the North American forms of *Myzia* as only subspecies of the European *Myzia* (*Neomysia*) *oblongoguttata* L. The only North American species with genitalia similar to those of *M. oblongoguttata* is *M. pullata*, and even in this case there are distinct genitalic differences. Therefore I consider the North American species congeneric with, but specifically distinct from, *M. oblongoguttata*.

KEY TO SPECIES OF *Myzia*

- 1. Lateral white border of pronotum with dark spot (Fig. 628a); central and eastern U.S. and Canada *pullata* (Say)
- Lateral border of pronotum white or not, never with dark spot; western North America 2
- 2(1). Elytron with lateral border broadly explanate, tapered to acute apex; head with dark area (at least on vertex); pronotum usually with median third black or brown (Fig. 632c) *subvittata* (Mulsant)
- Elytron with lateral border weakly explanate, rounded at apex; head immaculate; pronotum immaculate, or with pale brown spots (Fig. 630f) *interrupta* (Casey)

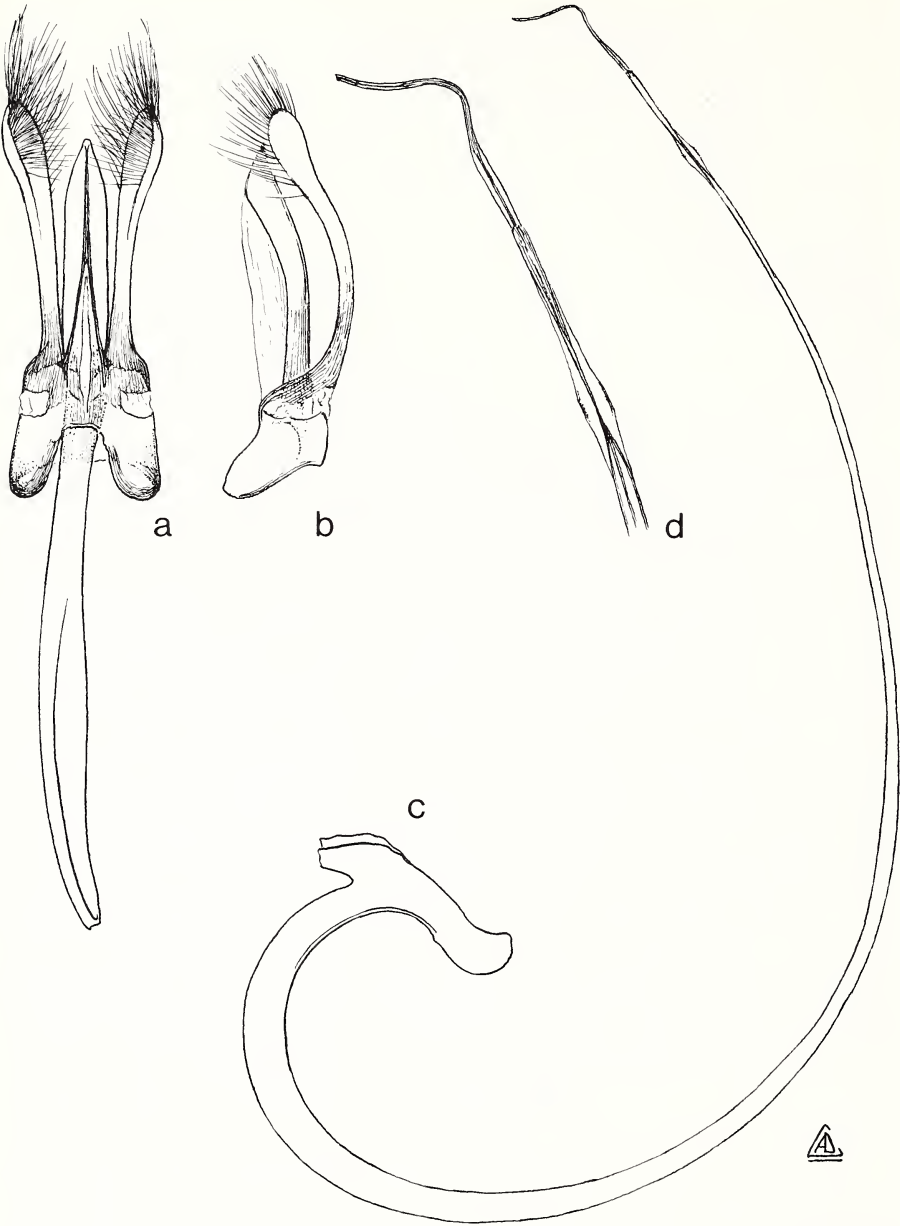


Fig. 627. *Myzia pullata* (male genitalia).

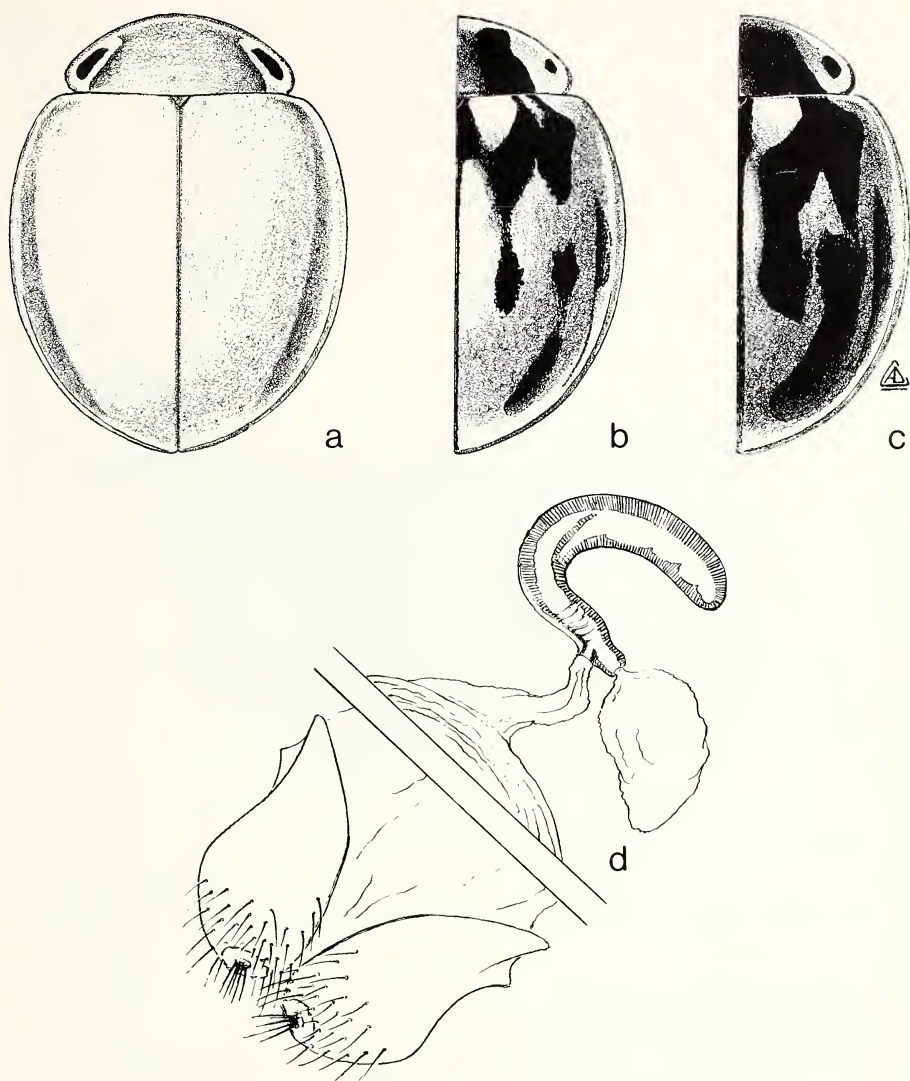


Fig. 628. *Myzia pullata* (habitus and variation, female genitalia).

Myzia pullata (Say)

Fig. 627a-d, 628a-d; Map, Fig. 629

Coccinella pullata Say, 1826, p. 301.

Mysia pullata: Mulsant, 1850, p. 1023.—Crotch, 1873, p. 375.—Crotch, 1874b, p. 125.—Wickham, 1894, p. 303.

Neomysia pullata: Casey, 1899, p. 99.—Leng, 1903b, p. 209.—Blatchley, 1910, p. 516.—Korschefsky, 1932, p. 546.—Wingo, 1952, p. 47.

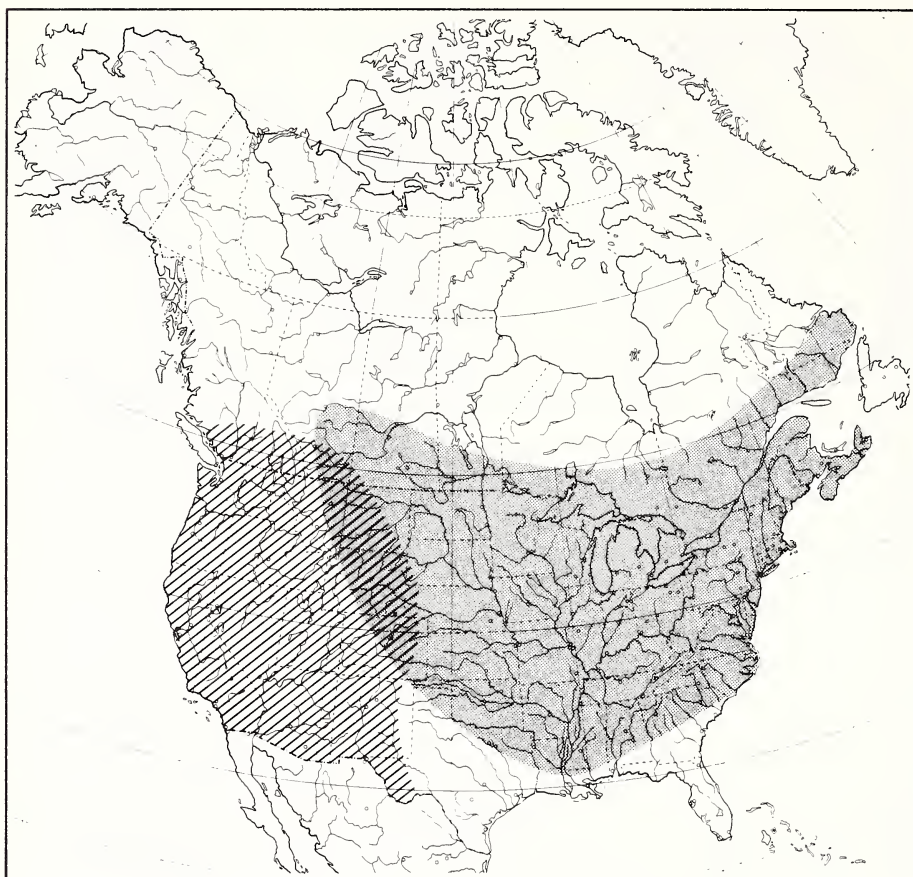


Fig. 629. Distribution. *Myzia pullata* (shaded, eastern); *M. interrupta* (cross hatch, western).

Coccinella notans Randall, 1838b, p. 49.

Myzia notans: Mulsant, 1850, p. 1023.

Neomysia randalli Casey, 1899, p. 99.—Leng, 1920, p. 217.—Korschefsky, 1932, p. 546.—Wingo, 1952, p. 47.—Belicek, 1976, p. 325.

Neomysia montana Casey, 1899, p. 100.—Leng, 1920, p. 217.—Korschefsky, 1932, p. 543.—Belicek, 1976, p. 325.

Neomysia pullata var. *randalli*: Leng, 1903b, p. 209.

Neomysia oblongoguttata pullata: Timberlake, 1943, p. 23.—J. Chapin, 1974, p. 69.

Myzia pullata: Belicek, 1976, p. 325.

Diagnosis. Length 6.50 to 8.0 mm, width 5.20 to 6.0 mm. Form oval, lateral border of elytron slightly explanate. Dorsal color typically pale brownish yellow; pronotum dark brown medially, broad lateral border white with a median dark brown spot often connected to median area (Fig. 628a); northern specimens often with dark

elytral maculae (Fig. 628b, c). Male genitalia as in Figure 627a–d. Female genitalia as in Figure 628d.

Discussion. Belicek (1976) correctly placed *randalli* and *montana* as junior synonyms of *pullata*. Both species are represented by a single type specimen each in the Casey collection which must be considered holotypes.

Type locality. Of *pullata*, “eastern coast of Virginia, and Florida”; of *notans*, Maine; of *randalli*, Lake Superior; of *montana*, Colorado.

Type depository. Of *pullata*, type no longer in existence; of *notans*, type not located; of *randalli*, USNM (35541); of *montana*, USNM (35542).

Distribution. Figure 629. Labrador to South Carolina, west to Alberta and Colorado.

Myzia interrupta (Casey)

Fig. 630a–g; Map, Fig. 629

Neomysia interrupta Casey, 1899, p. 99.—Korschefsky, 1932, p. 543.

Neomysia hornii var. *interrupta*: Leng, 1903b, p. 209.

Neomysia horni: Casey, 1899, p. 99.—Leng, 1903, p. 209.—Korschefsky, 1932, p. 543.—Wingo, 1952, p. 47.—Hatch, 1961, p. 184 (not *hornii* Crotch).

Neomysia oblongoguttata caseyi Timberlake, 1943, p. 21. **New Synonymy.**

Neomysia oblongoguttata interrupta: Timberlake, 1943, p. 22.

Myzia horni: Belicek, 1976, p. 326 (not *hornii* Crotch).

Diagnosis. Length 6.50 to 8.0 mm, width 5.0 to 6.0 mm. Form oval, lateral border of elytron slightly explanate. Dorsal color pale yellowish brown; elytron usually with light brown vittae and pronotum with 3 light brown, basal maculae (Fig. 630f), pronotum often immaculate and elytral vittae reduced (Fig. 630g). Male genitalia as in Figure 630a–d. Female genitalia as in Figure 630e.

Discussion. *Myzia interrupta* is a valid species previously considered to be a synonym of *M. horni* Crotch (see remarks under *M. subvittata*). *Myzia interrupta* is represented in the Casey collection by a single type specimen which must be considered the holotype.

Type locality. Of *interrupta*, Fort Wingate, New Mexico; of *caseyi*, Eldorado Co., California.

Type depository. Of *interrupta*, USNM (35540); of *caseyi*, Koebele collection, Hawaii.

Distribution. Figure 629. Alberta to west Texas, west to British Columbia and California.

Myzia subvittata (Mulsant)

Fig. 631a–d, 632a–e; Map, Fig. 633

Mysia subvittata Mulsant, 1850, p. 138.—Crotch, 1874b, p. 125.—Wickham, 1894, p. 303.

Anatis subvittata: Crotch, 1873, p. 375.

Mysia hornii Crotch, 1873, p. 375. **New Synonymy.**

Neomysia subvittata: Leng, 1903, p. 209.—Korschefsky, 1932, p. 547.—Hatch, 1961, p. 184.

Neomysia oblongoguttata subvittata: Timberlake, 1943, p. 22.

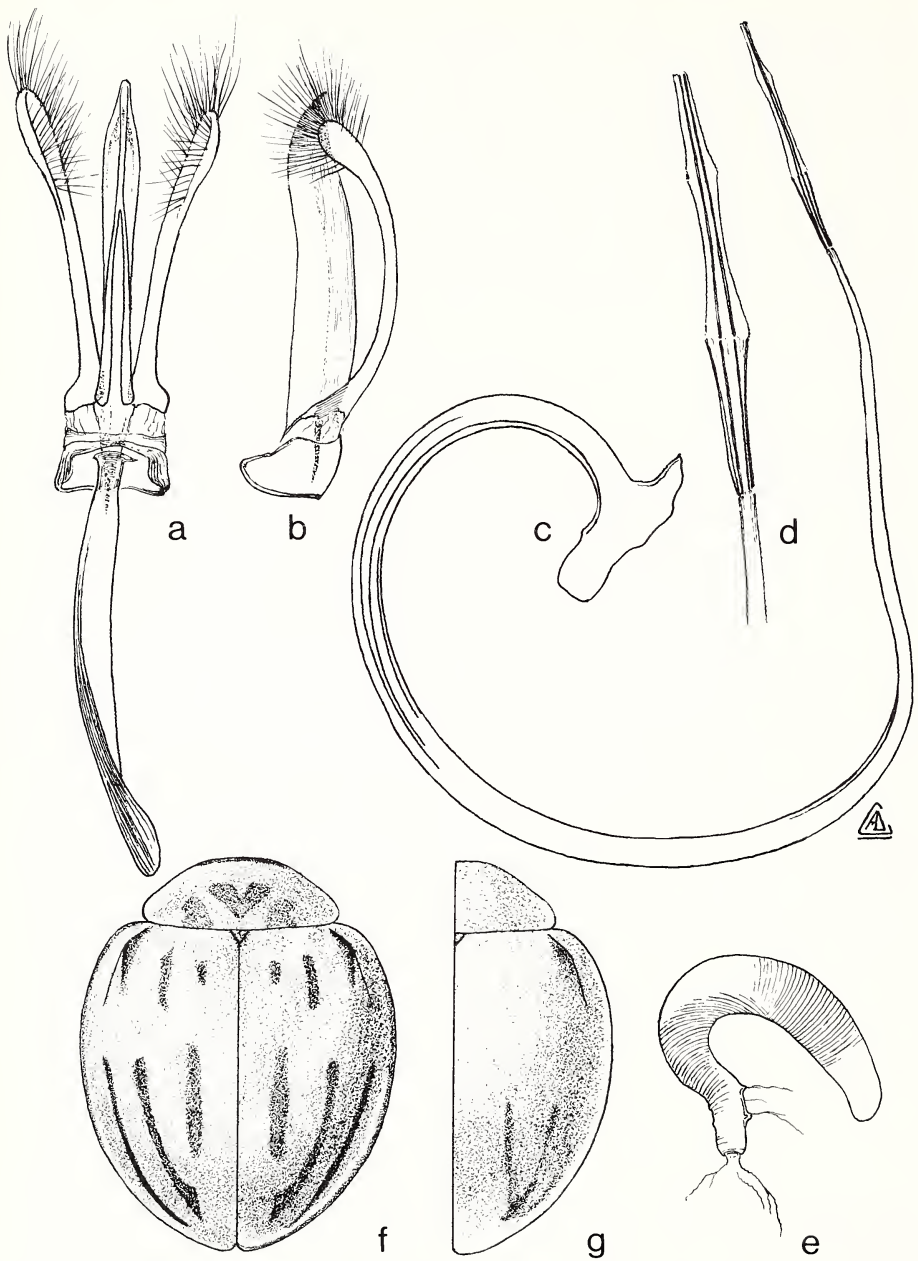


Fig. 630. *Myzia interrupta*.

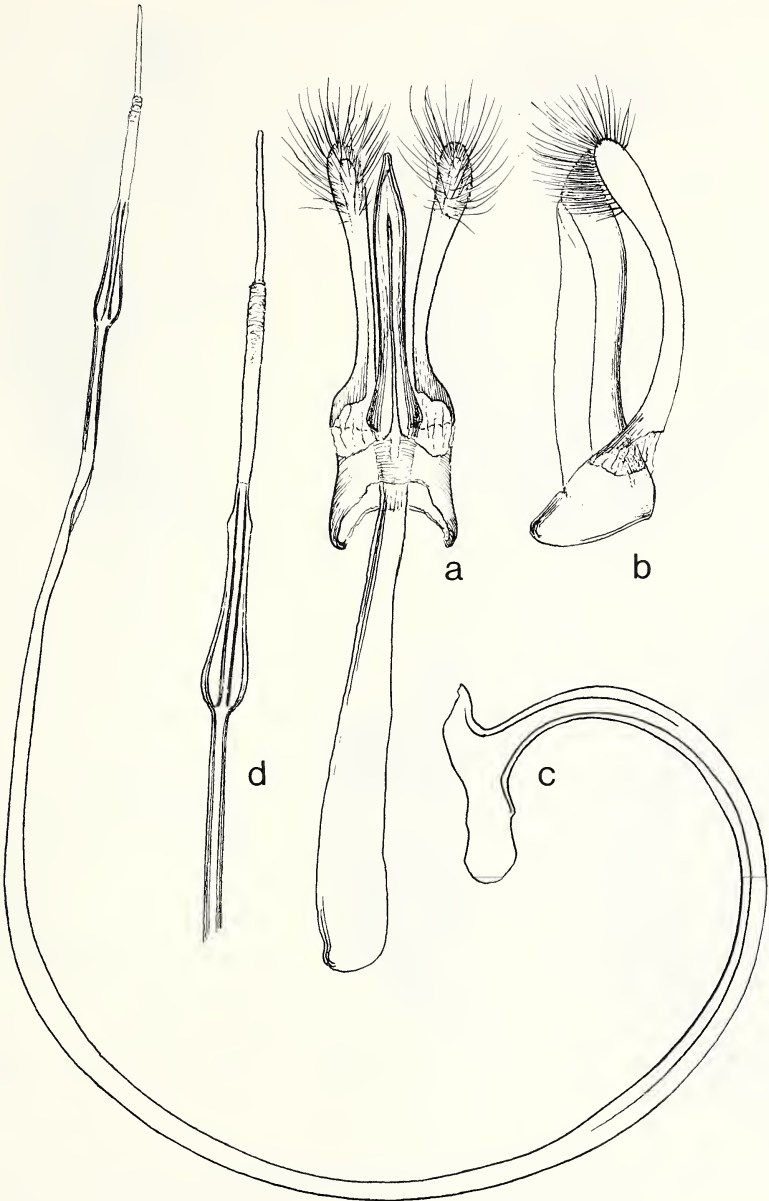


Fig. 631. *Myzia subvittata* (male genitalia).

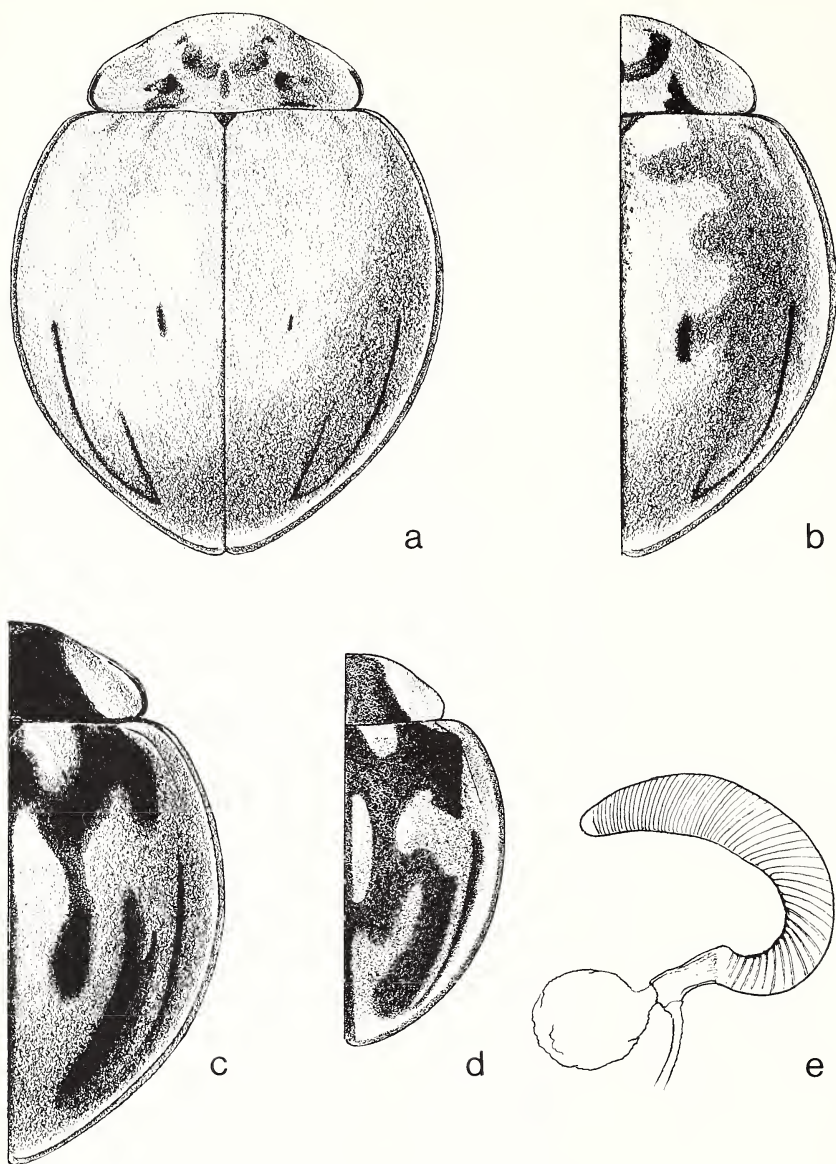


Fig. 632. *Myzia subvittata* (habitus and variation, female genitalia).

Myzia subvittata: Belicek, 1976, p. 235.

Neomysia oregona Casey, 1924, p. 160.—Hatch, 1961, p. 184.

Diagnosis. Length 5.70 to 8.0 mm, width 4.50 to 6.50 mm. Form somewhat triangular, tapered to acute apex in apical third, lateral border of elytron broadly explanate in front of middle. Dorsal color yellowish brown; elytron with dark brown

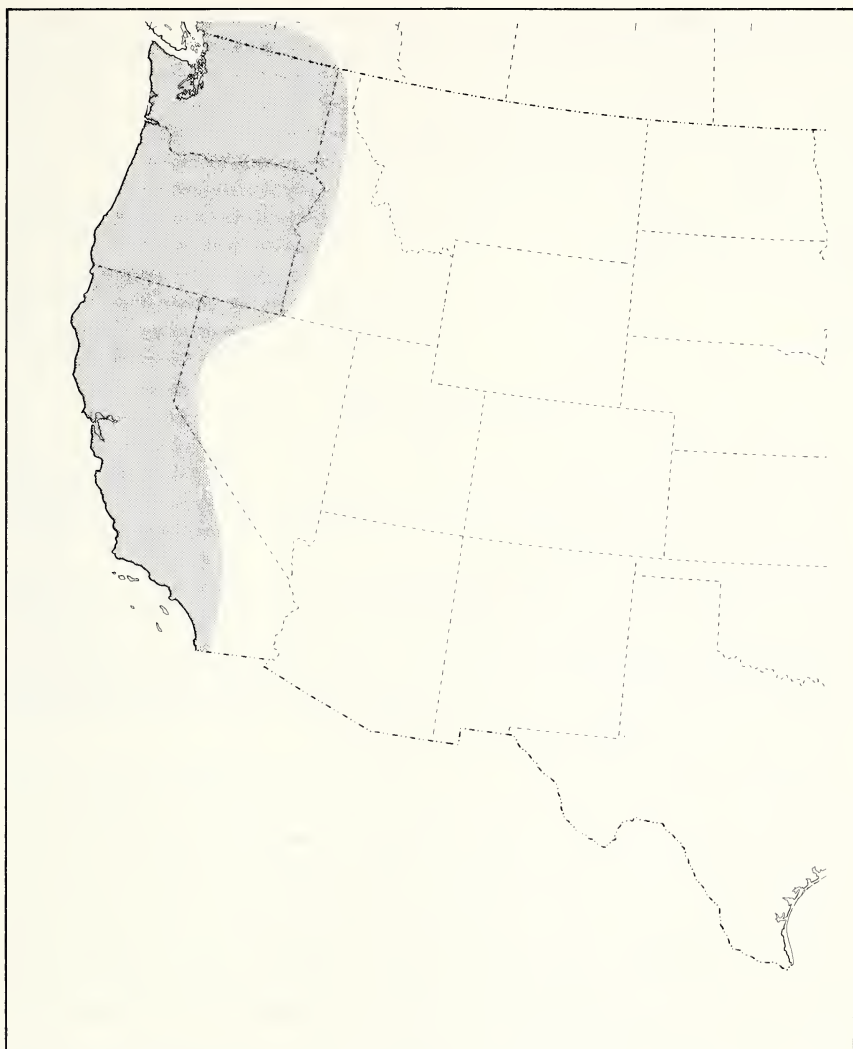


Fig. 633. Distribution. *Myzia subvittata*.

vittae, pronotum dark brown with broad, yellowish white lateral border (Fig. 632c), pronotum often nearly immaculate and elytral vittae strongly reduced (Fig. 632a, b). Male genitalia as in Figure 631a–d. Female genitalia as in Figure 632e.

Discussion. The broadly explanate border of the elytron and posteriorly tapered form characterize *M. subvittata*. It is apparent from the original description that *M. horni* Crotch is conspecific with *M. subvittata* Mulsant. Casey (1899) did not detect this and associated the name *M. horni* with the form of *Myzia* having 3 pale pronotal maculae. He was followed in this by subsequent authors including Belicek (1976). Casey (1899) described *M. interrupta* which is the same species as his “*horni*” and

later (1924) described *M. oregona* which is a synonym of *M. subvittata*. The type of *M. subvittata* in the Crotch collection is a female holotype labeled "Type (blue paper)/ Type subvittata Reiche." The type of *M. horni* is supposed to be in the MCZ collection, but no such specimen is currently there. The 2 specimens under that name have the wrong locality data to qualify as types. *Myzia oregona* is represented in the Casey collection by a single type specimen which must be considered the holotype.

Type locality. Of *subvittata*, "les parties occidentales de l'Amerique du Nord" (lectotype here designated); of *horni*, Oregon; of *oregona*, Bull Run, Clackamas Co. (Big Sandy Camp), Oregon.

Type depository. Of *subvittata*, UCCC; of *horni*, not located; of *oregona*, USNM (35543).

Distribution. Figure 633. British Columbia and Idaho south to southern California.

Genus *Calvia* Mulsant

Calvia Mulsant, 1850, p. 143.—Crotch, 1874b, p. 143.—Chapuis, 1876, p. 183.—Mader, 1926, p. 20.—Hatch, 1961, p. 181.—Belicek, 1976, p. 326.—Iablokoff-Khnzorian, 1982, p. 176. Type-species; *Coccinella decemguttata* L., by subsequent designation of Crotch, 1874b.

Anisocalvia Crotch, 1871, p. 329.—Casey, 1899, p. 96.—Leng, 1903b, p. 206.—Wingo, 1952, p. 24. Type-species; *Coccinella quatuordecimguttata* (L.), by subsequent designation of Crotch, 1874b.

Calvia (*Anisocalvia*): Korschefsky, 1932, p. 521.—Iablokoff-Khnzorian, 1982, p. 184. *Eocaria* Timberlake, 1943, p. 37.—Iablokoff-Khnzorian, 1982, p. 176. Type-species; *Eocaria muiri* Timberlake, by original designation.

Coccinellini with length 4.0 to 6.0 mm, form oval, not strongly convex. Dorsal surface polished between punctures, alutaceous sculpture lacking. Dorsal color pattern extremely variable. Anterolateral angle of clypeus produced forward. Lateral margin of elytron feebly explanate; epipleuron weakly descending externally. Intercostal process of prosternum with broad lateral ridge extending nearly to apex of prosternum, median area convex (Fig. 634a). Apical margin of mesosternum triangularly emarginate (Fig. 634a). Apex of middle and hind tibia each with 2 spurs. Tarsal claw with subquadrate basal tooth. Postcoxal line incomplete, of *Diomus* type (Fig. 634b). Male genitalia symmetrical. Female genitalia lacking infundibulum; coxal plate short, subtriangular, with strong apical stylus (Fig. 634g).

Calvia is the only genus of North American Coccinellini without at least some trace of alutaceous sculpture on the pronotum, and this is the only good recognition character for the genus. *Calvia* is primarily an Old World genus with approximately 20 species names, mainly in the Palearctic region. *Calvia quatuordecimguttata* is a holarctic species and the only North American representative of the genus. Members of *Calvia* have been reported as predaceous on aphids, scale insects and other soft bodied insects, but specific host data has been lacking until recently. Semjanov (1980) reported *C. quatuordecimguttata* as a predator of Psyllidae and of aphids, but preferentially a psyllid predator. Specific host data is as follows: Aphididae: *Aphis pomi* Degeer; *Eucallipterus tiliae* (L.); *Euceraphis punctipennis* (Zetterstedt); *Hyalopterus pruni* Geoffroy; *Pterocallis alni* (Degeer); *Rhopalosiphum insertum* (Walker); *Rho-*

palosiphum padi (L.); Psyllidae: *Psylla alni* L.; *P. mali* Schmdb. McMullen and Jong (1967) reported this species as a predator of *Psylla pyricola* Forster in British Columbia.

Calvia quatuordecimguttata (L.)

Fig. 634a–g, 635; Map, Fig. 636

Coccinella 14-guttata L., 1758, p. 367.

Coccinella 12-maculata Gebler, 1832, p. 76.

Coccinella incarnata Kirby, 1837, p. 231.

Coccinella cardisce Randall, 1838a, p. 32.

Coccinella obliqua Randall, 1838a, p. 33.

Coccinella similis Randall, 1838b, p. 50.

Harmonia duodecimmaculata: Mulsant, 1850, p. 86.—Wickham, 1894, p. 302.

Harmonia incarnata: Mulsant, 1850, p. 86.

Calvia quatuordecimguttata: Mulsant, 1850, p. 144.—Korschefsky, 1932, p. 524.—Belicek, 1976, p. 327.

Anisocalvia 14-guttata: Crotch, 1873, p. 373.—Timberlake, 1943, p. 20.

Anisocalvia 14-guttata var. *similis*: Crotch, 1873, p. 373.

Anisocalvia 14-guttata var. *cardisce*: Crotch, 1873, p. 373.

Anisocalvia 14-guttata var. *hesperica* Crotch, 1873, p. 374.—Leng, 1920, p. 217.

Anisocalvia 12-maculata: Crotch, 1873, p. 374.

Coccinella duodecimmaculata: Crotch, 1874b, p. 110.—Weise, 1885a, p. 38.

Anisocalvia quatuordecimguttata: Crotch, 1874b, p. 144.—Wingo, 1952, p. 46.

Anisocalvia cardisce: Casey, 1899, p. 96.

Anisocalvia victoriana Casey, 1899, p. 96.—Belicek, 1976, p. 327.

Anisocalvia 12-maculata: Casey, 1899, p. 97.—Leng, 1903, p. 207.—Wingo, 1952, p. 40.

Anisocalvia duodecim-maculata: Leng, 1920, p. 217.—Wingo, 1952, p. 40.

Anisocalvia duodecim-maculata a. *elliptica* Leng, 1920, p. 217.

Anisocalvia elliptica Casey, 1899, p. 97.—Belicek, 1976, p. 327.

Anisocalvia quatuordecimguttata: Leng, 1903b, p. 206.

Anisocalvia quatuordecimguttata var. *cardisce*: Leng, 1903b, p. 206.

Anisocalvia quatuordecimguttata var. *similis*: Leng, 1903b, p. 206.

Anisocalvia quatuordecimguttata var. *victoriana*: Leng, 1903b, p. 206.

Anisocalvia incarnata: Leng, 1903b, p. 207.

Agrabia sicardi Nunenmacher, 1912, p. 448.—Gordon, 1974, p. 170.

Agrabia sicardi var. *complexa* Nunenmacher, 1912, p. 448.—Gordon, 1974, p. 170.

Anisocalvia 12-maculata var. *elliptica*: Leng, 1903b, p. 207.

Anisocalvia lacustris Casey, 1924, p. 158.—Belicek, 1976, p. 327.

Anisocalvia bicordifera Casey, 1924, p. 159.—Belicek, 1976, p. 327.

Anisocalvia vancouveri Casey, 1924, p. 159.—Belicek, 1976, p. 327.

Anisocalvia quadrisignata Casey, 1924, p. 159.—Belicek, 1976, p. 327.

Anisocalvia postplagiata Casey, 1924, p. 159.—Belicek, 1976, p. 327.

Anisocalvia uniformis Casey, 1924, p. 160.—Belicek, 1976, p. 327.

Calvia 12-maculata: Mader, 1931, p. 193.—Korschefsky, 1932, p. 523.—Hatch, 1961, p. 182.

Calvia (*Anisocalvia*) *duodecimmaculata* ab. *elliptica*: Korschefsky, 1932, p. 523.
Calvia quatuordecimguttata ab. *bicordifera*: Korschefsky, 1932, p. 526.
Calvia quatuordecimguttata ab. *cardisce*: Korschefsky, 1932, p. 526.
Calvia quatuordecimguttata ab. *lacustris*: Korschefsky, 1932, p. 526.
Calvia quatuordecimguttata ab. *obliqua*: Korschefsky, 1932, p. 526.
Calvia quatuordecimguttata ab. *postplagiata*: Korschefsky, 1932, p. 527.
Calvia quatuordecimguttata ab. *quadrisignata*: Korschefsky, 1932, p. 527.
Calvia quatuordecimguttata ab. *similis*: Korschefsky, 1932, p. 527.
Calvia quatuordecimguttata ab. *uniformis*: Korschefsky, 1932, p. 527.
Calvia quatuordecimguttata ab. *vancouveri*: Korschefsky, 1932, p. 527.
Calvia quatuordecimguttata victoriana: Korschefsky, 1932, p. 527.
Calvia 14-guttata: Hatch, 1961, p. 181.

Diagnosis. Length 4.0 to 5.5 mm, width 3.2 to 4.5 mm. Dorsal color pattern extremely variable, background color either pale or dark (Fig. 635a–k). Male genitalia as in Figure 634c–f. Female genitalia as in Figure 634g.

Discussion. The many color morphs and wide geographic range of this species have caused a number of names to be proposed for what is a single polymorphic species. Most of these names were recently synonymized by Belicek (1976). The synonymy listed here includes only names involving North American color variants; for complete synonymy, including Old World variants, see Korschefsky (1932). The Casey names *victoriana*, *elliptica*, *bicordifera*, *vancouveri* and *uniformis* were each based on a single specimen which must be considered the holotype. There are 6 types of *lacustris* in the Casey collection, the first of which is here designated and labeled as the lectotype with the other 5 as paralectotypes. There are 5 types of *quadrisignata*, the first of which is here designated and labeled as the lectotype with the other 4 as paralectotypes. There are 3 types of *postplagiata*, the first of which is here designated and labeled as the lectotype, the other 2 as paralectotypes.

Type locality. Of *quatuordecimguttata*, "Europe"; of *duodecimmaculata*, Siberia; of *incarnata*, "60 N."; of *cardisce*, Maine; of *obliqua*, Maine; of *similis*, Massachusetts; of *victoriana*, British Columbia; of *elliptica*, Hudson Bay; of *sicardi* and *complexa*, Hornbrook, Siskiyou Co., California; of *lacustris*, Marquette, Michigan (lectotype here designated); of *bicordifera*, Lake George, New York; of *vancouveri*, British Columbia; of *quadrisignata*, Marquette, Lake Superior (lectotype here designated); of *postplagiata*, Marquette, Lake Superior (lectotype here designated); of *uniformis*, Adirondack Mts., New York.

Type depository. Of *quatuordecimguttata*, Linnean Society, London; of *duodecimmaculata*, not located; of *incarnata*, not located; of *cardisce*, *obliqua*, and *similis*, types apparently lost; of *elliptica*, *victoriana*, *lacustris*, *bicordifera*, *vancouveri*, *quadrisignata*, *postplagiata*, and *uniformis*, USNM; of *sicardi*, and *complexa*, CAS.

Distribution. Figure 636. Labrador to New Jersey, west to Alaska and northern California.

Genus *Adalia* Mulsant

Adalia Mulsant, 1846, *errata addenda* p. 2.—Crotch, 1873, p. 372.—Crotch, 1874b, p. 99.—Gorham, 1891, p. 154.—Wickham, 1894, p. 299.—Casey, 1899, p. 82.—

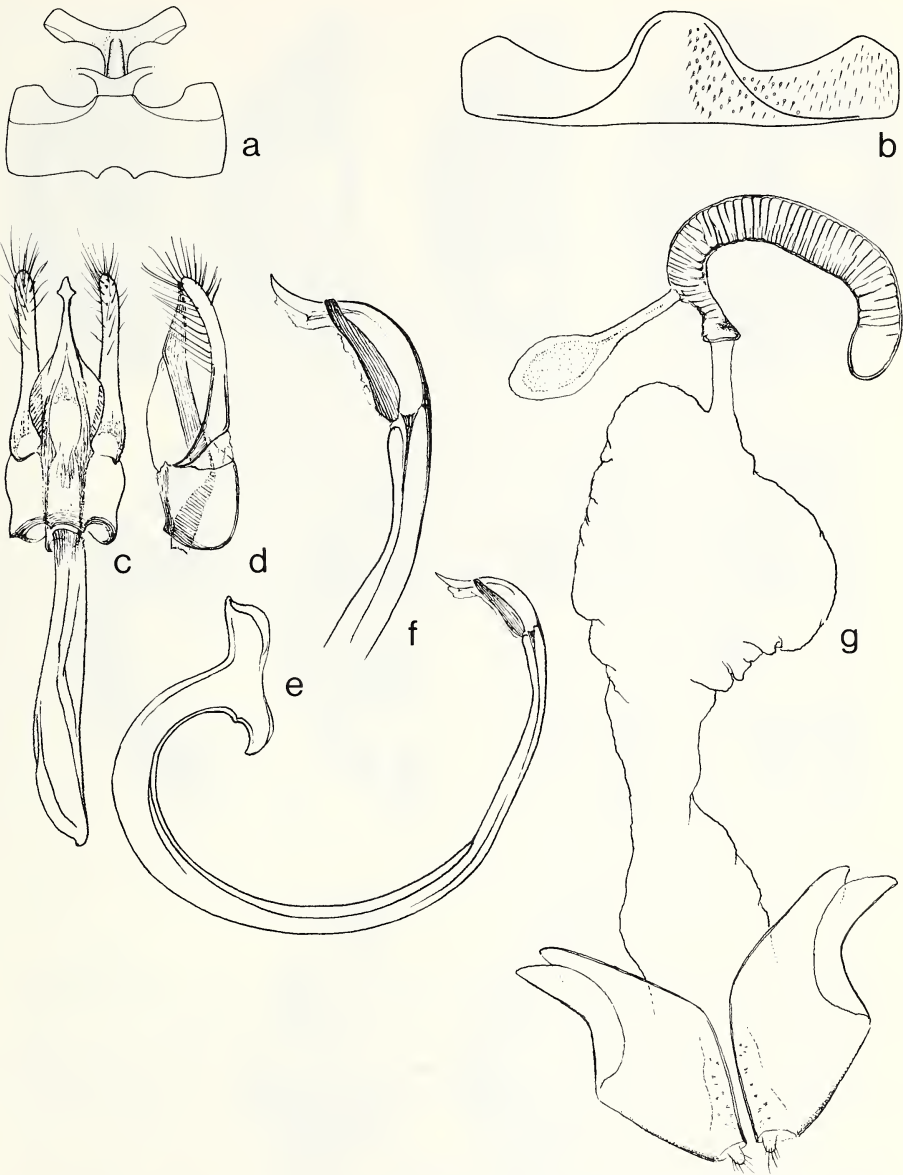


Fig. 634. *Calvia quatuordecimguttata*. a. Prosternum, mesosternum, and metasternum. b. Postcoxal lines. c-g. Genitalia.

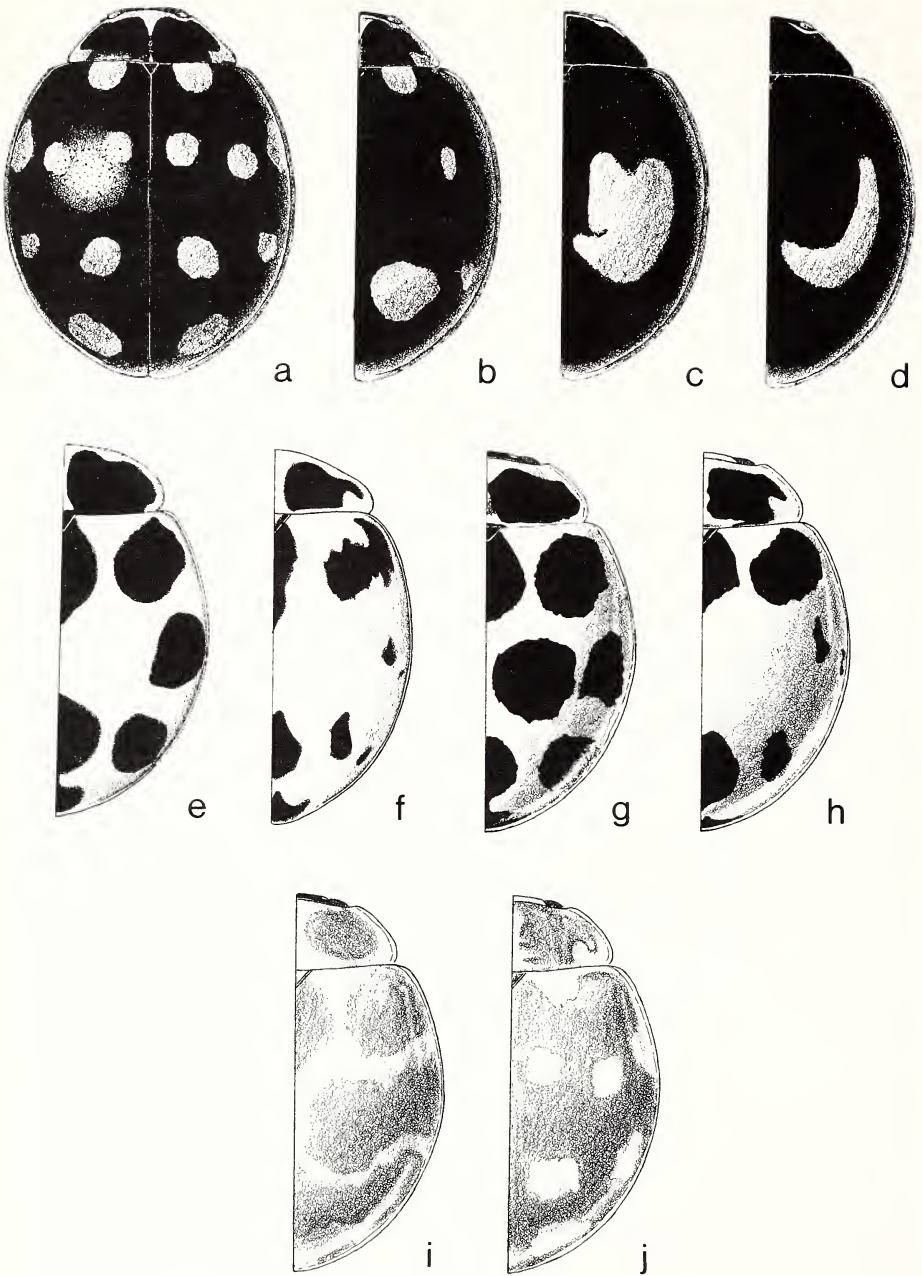


Fig. 635. *Calvia quatuordecimguttata* (habitus and variation).



Fig. 636. Distribution. *Calvia quatuordecimguttata*.

Leng, 1903b, p. 194.—Korschefsky, 1932, p. 384.—Wingo, 1952, p. 24.—J. Chapin, 1974, p. 65.—Belicek, 1976, p. 328.—Iablokoff-Khnzorian, 1982, p. 429. Type-species; *Coccinella bipunctata* L., by subsequent designation of Crotch, 1874b. *Idalia* Mulsant, 1846, p. 44.—Mulsant, 1850, p. 49 (not *Idalia* Hubner, 1819). *Arrowella* Brethes, 1925, p. 147.—Korschefsky, 1932, p. 385. Type-species; *Arrowella porteri* Brethes, by monotypy.

Coccinellini with length 3.50 to 5.50 mm; form oval, weakly convex. Polymorphic in dorsal color pattern. Anterolateral angle of clypeus produced forward. Pronotum and elytron with lateral margin feebly explanate, usually semitransparent; epipleuron obliquely inclined. Intercoxal process of prosternum smooth, slightly convex, with weak lateral ridge extending anteriorly as far as anterior margin of coxa. Apical margin of mesosternum truncate, ridged. Apex of middle and hind tibia each with 2 spurs. Tarsal claw with basal, subquadrate tooth. Postcoxal line complete or nearly so, of

Pullus type (Fig. 637a). Male genitalia symmetrical. Female genitalia with large infundibulum (Fig. 637f).

Adalia is characterized by the truncate apex of the mesosternum and complete postcoxal line; in addition, the pronotum always has a pale M-shaped mark at the middle of the base except in the melanic forms. Members of *Adalia* are distributed worldwide with approximately 35 species in the genus, only one of which, *A. bipunctata*, occurs in North America. *Adalia bipunctata* is extremely widespread, being very common in Europe and also occurring in South America. Members of *Adalia* are aphid and adelgid predators with specific host records as follows: Adelgidae: *Adelges laricis* (Vallot), *Pineus pini* (Macquart), *Pineus strobi* (Hartig). Aphidae: *Acyrtosiphon carnosum* (Buckton), *Acyrtosiphon dirhodum* (Walker), *Acyrtosiphon pisum* (Harris), *Acyrtosiphon urticae* (Schrank), *Acyrtosiphon solani* (Kaltenbach), *Amphorophora rubi* (Kaltenbach), *Anoraphis farfarae* (Koch), *Aphis fabae* Scopoli, *Aphis farinosa* (Gmelin), *Aphis gossypii* Glover, *Aphis hederæ* (Kaltenbach), *Aphis pomi* Degeer, *Aphis rumicis* (L.), *Aphis sambuci* (L.), *Aphis* sp., *Aphis urticae* (Gmelin), *Aphis viburni* (Scopoli), *Betulaphis quadratuberculata* (Kaltenbach), *Brachycaudus helichrysi* (Kaltenbach), *Brevicoryne brassicae* (L.), *Capitophorus elongatus* Knowlton, *Cavariella aegopodi* (Scopoli), *Cavariella* sp., *Chaitophorus capreae* (Mosley), *Chaitophorus veriscolor* (Koch), *Chromaphis juglandica* (Kaltenbach), *Chromaphis juglandicola* (Kaltenbach), *Cryptomyzus ribis* (L.), *Dactynotus cirsii* (L.), *Dactynotus eoessigi* (Knowlton), *Dactynotus sonchi* (L.), *Drepanosiphum platanoidis* (Schrank), *Dysaphis devector* (Walker), *Dysaphis sorbi* (Kaltenbach), *Elatobium abietinum* (Walker), *Eriosoma lanigerum* (Hausmann), *Eriosoma pyricola* (Baker and Davidson), *Euceraphis punctipennis* (Zetterstedt), *Euceraphis tiliae* (L.), *Hyalopterus pruni* (Geoffroy), *Laingia psammae* (Theobald), *Macrosiphum euphorbiae* (Thomas), *Macrosiphum rosae* (L.), *Monellia caryella* (Fitch), *Monelliopsis californica* (Essig), *Monelliopsis caryae* (Monell), *Myzocallis boernerii* (Stroyan), *Myzocallis carpini* (Koch), *Myzocallis castanicola* (Baker), *Myzocallis coryli* (Goeze), *Myzus cerasi* (F.), *Myzus persicae* (Sulzer), *Nearctaphis bakeri* (Cowen), *Nearctaphis crataegifolia* (Fitch), *Pemphigus bursarius* (L.), *Periphyllus lyropictus* (Kessler), *Periphyllus negundinis* (Thomas), *Periphyllus testundinaceus* (Fernie), *Phorodon humuli* (Schrank), *Phorodon menthae* (Buckton), *Phyllaphis fagi* (L.), *Pterocallis alni* (Degeer), *Rhopalosiphum insertum* (Walker), *Thelaxes dryophila* (Schrank), *Tuberculoides annulatus* (Hartig), *Tubero-lachnus salignus* (Gmelin).

Adalia was taxonomically treated by Iablokoff-Khnzorian (1982).

Adalia bipunctata (L.)

Fig. 637a-l; Map, Fig. 638

Coccinella 2-punctata L., 1758, p. 364.

Coccinella frigida Schneider, 1792, p. 172.

Coccinella bioculata Say, 1824, p. 94.

Coccinella humeralis Say, 1824, p. 95.—Mulsant, 1850, p. 1049.

Coccinella disjuncta Randall, 1838a, p. 33.—Mulsant, 1850, p. 1049.

Idalia bipunctata: Mulsant, 1846, p. 51.

Adalia opthalmica Mulsant, 1850, p. 56.—Crotch, 1874b, p. 101.—Casey, 1899, p.

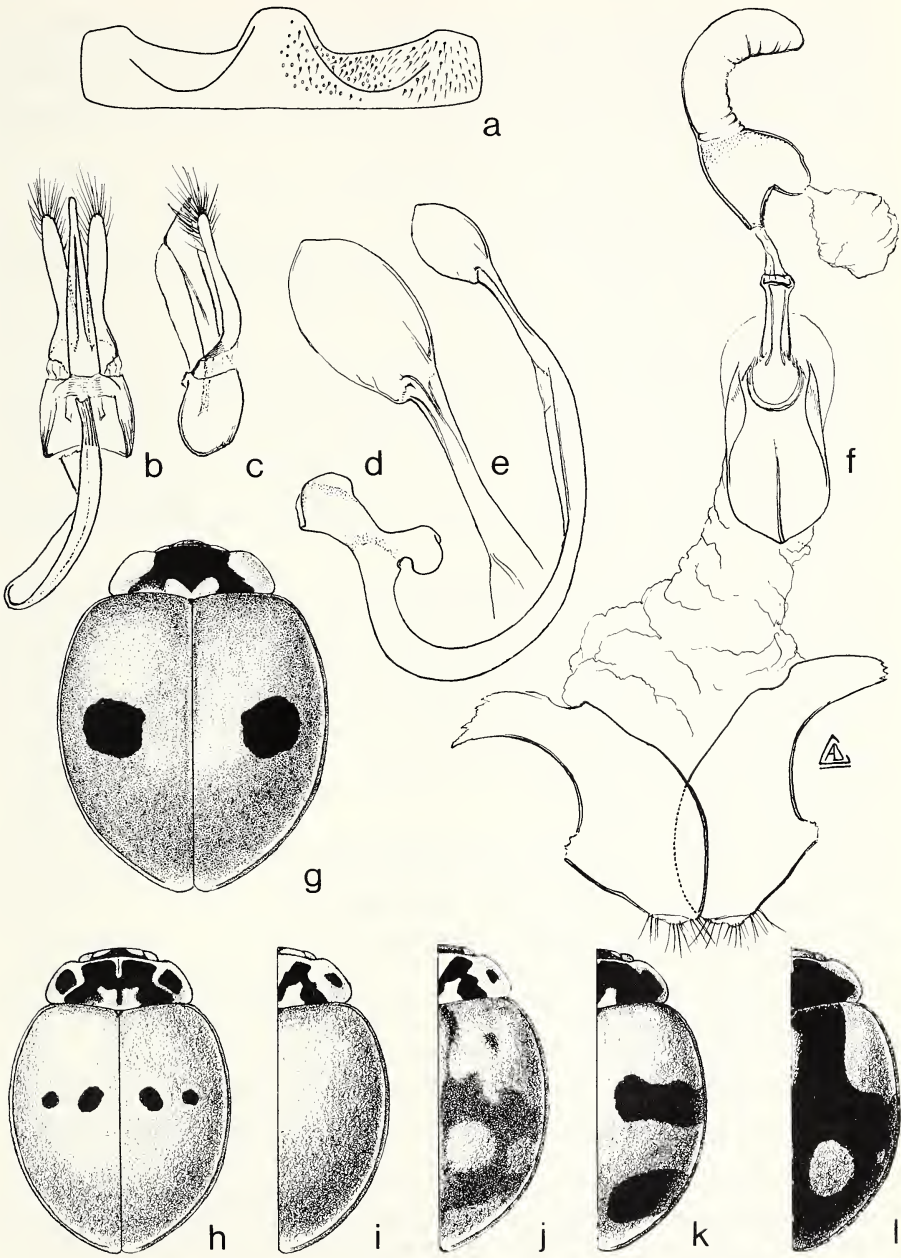


Fig. 637. *Adalia bipunctata*.

- Adalia bipunctata*: Mulsant, 1850, p. 58.—Crotch, 1873, p. 372.—Crotch, 1874b, p. 102.—Wickham, 1894, p. 302.—Casey, 1899, p. 85.—Leng, 1903b, p. 195.—Blatchley, 1910, p. 191.—Palmer, 1911, p. 289.—Palmer, 1917, p. 289.—Korschefsky, 1932, p. 385.—Wingo, 1952, p. 46.—J. Chapin, 1974, p. 65.—Belicek, 1976, p. 328.—Iablokoff-Khnzorian, 1982, p. 438.
- Coccinella melanopleura* LeConte, 1859b, p. 286.
- Adalia ludovicae* Mulsant, 1866, p. 36.—Leng, 1920, p. 217.
- Coccinella annectans* Crotch, 1873, p. 371.
- Adalia frigida*: Crotch, 1873, p. 372.—Crotch, 1874b, p. 100.—Leng, 1903b, p. 195.—Korschefsky, 1932, p. 430.—Timberlake, 1943, p. 15.—Wingo, 1952, p. 40.
- Adalia bipunctata* var. *humeralis*: Crotch, 1873, p. 373.
- Adalia bioculata*: Crotch, 1874b, p. 102.
- Adalia melanopleura*: Casey, 1899, p. 85.—Palmer, 1914, p. 283.
- Adalia humeralis*: Casey, 1899, p. 85.—Leng, 1903b, p. 196.—Palmer, 1914, p. 285.
- Adalia ovipennis* Casey, 1899, p. 86.—Lusis, 1947, p. 826.
- Adalia transversalis* Casey, 1899, p. 86.—Lusis, 1947, p. 826.
- Adalia ornatella* Casey, 1899, p. 86.
- Adalia annectans*: Casey, 1899, p. 86.—Leng, 1903b, p. 195.—Palmer, 1911, p. 299.—Palmer, 1914, p. 283.
- Adalia frigida* var. *melanopleura*: Leng, 1903b, p. 195.—Korschefsky, 1932, p. 432.
- Adalia frigida* var. *ophthalmica*: Leng, 1903b, p. 195.—Korschefsky, 1932, p. 432.
- Adalia frigida* var. *disjuncta*: Leng, 1903b, p. 195.—Korschefsky, 1932, p. 432.
- Adalia frigida* var. *ornatella*: Leng, 1903b, p. 195.—Korschefsky, 1932, p. 432.
- Adalia frigida* ab. *postica*: Korschefsky, 1932, p. 432.
- Adalia annectans* var. *ovipennis*: Leng, 1903b, p. 196.—Johnson, 1910, p. 71.—Korschefsky, 1932, p. 437.
- Adalia annectans* var. *transversalis*: Leng, 1903b, p. 196.—Johnson, 1910, p. 71.—Korschefsky, 1932, p. 437.
- Adalia coloradensis* Casey, 1908, p. 401.—Palmer, 1914, p. 285.
- Adalia annectans* var. *postica* Johnson, 1910, p. 68.
- Adalia bipunctata* var. *sempustulata* Johnson, 1910, p. 71.
- Adalia bipunctata* var. *ocellata* Johnson, 1910, p. 71.
- Adalia bipunctata* var. *humeralis* Johnson, 1910, p. 71 (not *humeralis* Say, 1824).
- Adalia annectans* ab. *duplicata* Leng, 1920, p. 217.—Korschefsky, 1932, p. 437 (new name for *humeralis* Johnson).
- Adalia bipunctata* ab. *bioculata*: Korschefsky, 1932, p. 389.

Diagnosis. Length 3.50 to 5.20 mm, width 2.80 to 4.0 mm. Dorsal color pattern highly variable (Fig. 637g–l). Male genitalia as in Figure 637b–e. Female genitalia as in Figure 637f.

Discussion. The variable color pattern and wide distribution of *A. bipunctata* have caused several names to be proposed by a variety of authors, both American and European. The synonymy listed here is not complete, see Leng (1920) and Korschefsky, (1932), for a complete synonymy. The type of *A. ophthalmica* was supposed to have been deposited in the BMNH, but R. D. Pope has searched for it without success so it is probably lost. The type of *C. annectans* was supposedly in the MCZ collection, but no such specimen(s) is currently there. The single specimen under that name has

the wrong locality data to qualify as a type. The holotype of *C. melanopleura* LeConte is labeled "(gold disc)/Type 6689 (red paper)/*C. melanopleura* Lec." Three species described by Casey, *A. ornatella*, *A. ovipennis*, and *A. transversalis*, are represented by single type specimens (holotypes). *Adalia coloradensis* is represented by 3 type specimens in the Casey collection, the first of which is here designated and labeled as the lectotype, the other 2 as paralectotypes.

Type locality. Of *bipunctata*, "Europe"; of *frigida*, not stated; of *bioculata*, "United States"; of *humeralis*, "Arkansas"; of *disjuncta*, Maine; of *melanopleura*, California; of *ophthalmica*, "l'Amerique du Nord"; of *annectans*, Colorado; of *ovipennis*, Yountville, Napa Co., California; of *transversalis*, Las Vegas, New Mexico; of *ornatella*, Colorado; of *coloradensis*, Boulder Co., Colorado (lectotype here designated); of *postica*, Springfield, Massachusetts; of *sexpustulata* and *ocellata*, Hood River, Oregon.

Type depository. Of *bipunctata*, Linnean Society, London; of *frigida*, not located; of *bioculata*, *humeralis*, and *disjuncta*, types apparently lost; of *melanopleura*, MCZ; of *ophthalmica*, type apparently lost; of *annectans*, not known; of *ovipennis* (34911), *transversalis* (34912), *ornatella* (34913), and *coloradensis* (34917), USNM; of *postica*, *sexpustulata*, *ocellata*, and *humeralis* Johnson, supposedly in USNM but not found.

Distribution. Figure 638. Labrador to Alabama, west to Alaska and California.

Genus *Coccinella* L.

Coccinella L., 1758, p. 364.—Mulsant, 1850, p. 93.—LeConte, 1852, p. 130.—Crotch, 1873, p. 369.—Crotch, 1874b, p. 105.—Gorham, 1891, p. 154.—Casey, 1899, p. 83.—Dobzhansky, 1925a, p. 241.—Mader, 1926, p. 19.—Dobzhansky, 1931, p. 2.—Timberlake, 1943, p. 13.—Wingo, 1952, p. 23.—Hatch, 1961, p. 171.—Brown, 1962, p. 785.—J. Chapin, 1974, p. 61.—Belicek, 1976, p. 330.—Iablokoff-Khnzorian, 1982, 341. Type-species; *Coccinella septempunctata* L., by subsequent designation of Crotch, 1874b.

Coccinella Leach, 1815b, p. 116.—Korschefsky, 1932, p. 439.

Coccinella (*Coccinella*): Leng, 1903b, p. 197.

Spilota Billberg, 1820, p. 61.—Timberlake, 1919, p. 163.—Belicek, 1976, p. 331.

Type-species; *Coccinella undecimpunctata* L., by subsequent designation of Timberlake, 1919.

Coccinella (*Neococcinella*) Savoyskaya, 1969, p. 104.—Iablokoff-Khnzorian, 1982, p. 341. Type-species; *Coccinella undecimpunctata* L., by original designation.

Dobzhanskia Iablokoff-Khnzorian, 1970, p. 89.—Iablokoff-Khnzorian, 1982, p. 341.

Type-species; *Coccinella undecimpunctata* (L.), by original designation.

Coccinellini with length 4.0 to 7.0 mm; form broadly oval, moderately to strongly convex. Head entirely black, or with 2 pale spots or pale band; pronotum black with anterolateral angle with white spot varying in size, spots sometimes joined by pale band along anterior margin, ventral margin of anterolateral angle with pale spot of varying size; elytron yellow or red; maculate or not. Apex of clypeus nearly truncate, anterolateral angle produced forward. Lateral margin of elytron narrow, abruptly reflexed; epipleuron nearly flat. Intercoxal process of prosternum narrow, flat, with 2 convergent or parallel lateral carinae. Apical margin of mesosternum truncate. Apex of middle and hind tibia each with 2 spurs. Tarsal claw with large tooth, either

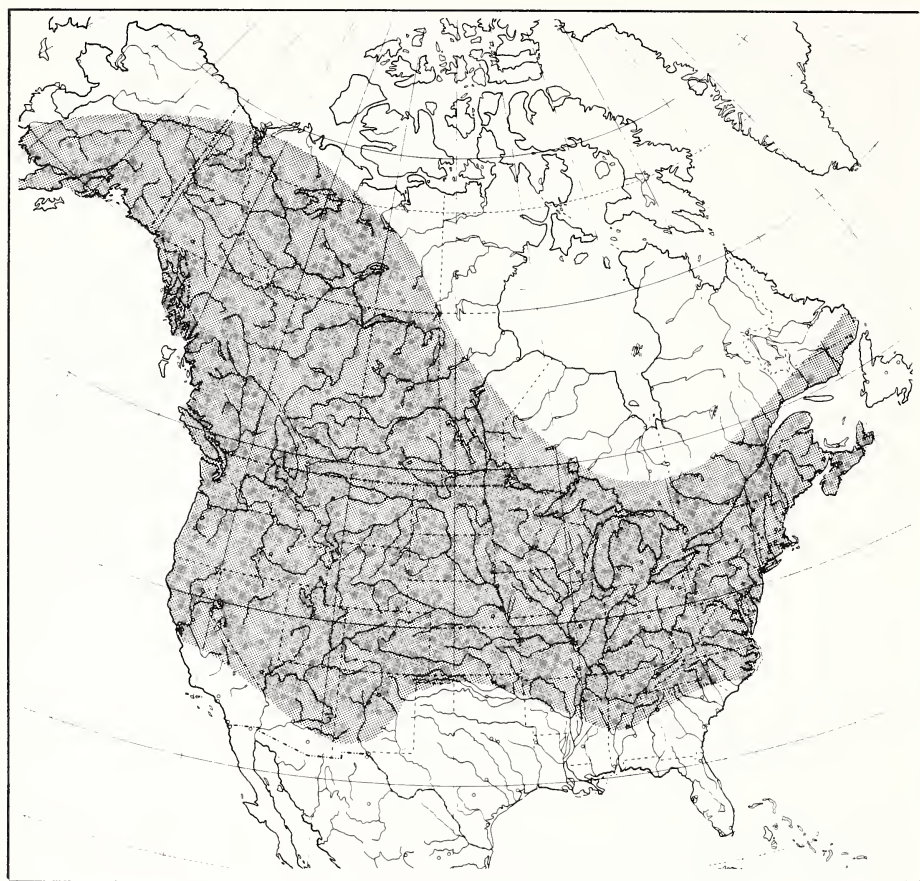


Fig. 638. Distribution. *Adalia bipunctata*.

basal or median (Fig. 1). Postcoxal line incomplete, of *Diomus* type, with oblique dividing line (Fig. 1). Male genitalia symmetrical. Female genitalia with infundibulum; coxal plate of the *Cycloneda* type.

Coccinella is usually separable from other coccinelline genera on the basis of the pronotal color pattern. This pattern and incomplete postcoxal line with oblique dividing line will distinguish this genus. *Coccinella* is mainly a holarctic genus; in the Western Hemisphere 5 species occur in Mexico, and 4 of these are northern species with southern range extensions. The generic synonymy presented here includes only those references pertinent to the genus in North America. Korschevsky (1932) is to be consulted for synonymy involving other geographic regions. Members of *Coccinella* are primarily aphid predators with specific host records as follows: *Acyrtosiphon carnosum* (Buckton), *Acyrtosiphon dirhodum* (Walker), *Acyrtosiphon pisum* (Harris), *Acyrtosiphon solani* (Kaltenbach), *Acyrtosiphon urticae* (Schrank), *Amphorophora rubi* (Kaltenbach), *Anuraphis farfarae* (Koch), *Aphis citri-*

cola (Van der Goot), *Aphis craccivora* (Koch), *Aphis epilobii* (Kaltenbach), *Aphis fabae* Scopoli, *Aphis forbesi* (Weed), *Aphis gossypii* Glover, *Aphis helianthi* (Monell), *Aphis jacobaeae* (Schrank), *Aphis nerii* (Boyer de Fonscolombe), *Aphis pomi* DeGeer, *Aphis rumicis* (L.), *Aphis sambuci* (L.), *Aphis urticata* (Gmelin), *Aphis viburni* (Scopoli), *Brachycaudus cardi* (L.), *Brachycaudus helichrysi* (Kaltenbach), *Brevicoryne brassicae* (L.), *Cachryphora serotinae* (Oestlund), *Capitophorus* sp., *Cavariella aegopodii* (Scopoli), *Cavariella essigi* (Gillette and Bragg), *Chromaphis juglandicola* (Kaltenbach), *Cryptomyzus ribis* (L.), *Cuernavaca noxius* (Mordvilko), *Dactynotus ambrosiae* (Thomas), *Dactynotus cirsii* (L.), *Dactynotus erigeronensis* (Thomas), *Dactynotus gobonis* (Matsumura), *Dactynotus sonchi* (L.), *Drepanosiphum platanoidis* (Schrank), *Dysaphis sorbi* (Kaltenbach), *Eriosoma lanigerum* (Hausmann), *Eucallipterus tiliae* (L.), *Hyalopterus atriplicis* (L.), *Hyalopterus pruni* (Geoffroy), *Hyadaphis erysimi* (Kaltenbach), *Hyadaphis foeniculi* (Passerini), *Hyperomyzus lactucae* (L.), *Laingia psammae* (Theobald), *Macrosiphoniella artemisiae* (Boyer de Fonscolombe), *Macrosiphoniella frigidicola* (Gillette and Palmer), *Macrosiphum avenae* (F.), *Macrosiphum euphorbiae* (Thomas), *Macrosiphum rosae* (L.), *Melanaphis sacchari* (Zehntner), *Melanocallis caryaefoliae* (Davis), *Monellia caryella* (Fitch), *Monelliopsis californica* (Essig), *Monelliopsis caryae* (Monell), *Monelliopsis nigropunctata* (Granovsky), *Myzaphis rosarum* (Kaltenbach), *Myzocallis asclepiadis* (Monell), *Myzus cerasi* (F.), *Myzus persicae* (Sulzer), *Nearcticaphis bakeri* (Cowen), *Nearctaphis crataegifoliae* (Fitch), *Pemphigus brevicornis* (Hart), *Pemphigus bursarius* (L.), *Pherioaphis trifolii* (Monell), *Phorodon humuli* (Schrank), *Pleotrichophorus* sp., *Rhopalosiphum padi* (L.), *Schizaphis graminum* (Rondani), *Therioaphis riehmerti* (Borner), *Toxoptera aurantii* (Boyer de Fonscolombe), *Tuberolachnus salignus* (Gmelin). Hippa et al. (1978) reported *Coccinella hieroglyphica* as an effective predator on eggs and larvae of the chrysomelid beetle *Galerucella* "nymphae" (L.) in Finland.

The North American species of *Coccinella* have been reviewed by Dobzhansky (1931) and Brown (1962). Brown's revision is an excellent treatment, and I herein use his key to species and species synonymies nearly verbatim, with only slight modification. For more detailed discussion of distribution and relationships see Brown (1962).

KEY TO SPECIES OF *Coccinella*

1. Elytron very largely or entirely black 2
- Elytron with extensive pale areas, at least basally 3
- 2(1). Elytron entirely black; mesepimeron white; length 5.50 to 6.30 mm; San Jacinto Mts., Riverside Co., California *prolongata bridwelli* Nunenmacher
- Elytron with epipleuron largely or entirely pale, sometimes with lateral and basal margin pale; mesepimeron black; length 4.0 to 4.80 mm; Vancouver Island to northern California *hieroglyphica humboldtiensis* Nunenmacher
- 3(1). Elytral suture very narrowly margined with dark brown or black, at least apically 4
- Elytral suture red, not or only slightly darker than the pale discal areas 9
- 4(3). Each elytron with a very large black spot which usually encloses a pale spot and is usually joined to the scutellar spot (Fig. 650g); east central California *prolongata sequoiae* Dobzhansky
- Elytral markings different 5

- 5(4). Head with 2 pale spots on front 6
 - Head with broad, pale band between eyes; anterior pronotal margin entirely pale *novemnnotata* Herbst
- 6(5). Elytron with small scutellar spot, lacking other spots; anterior pronotal margin black at middle; southwestern British Columbia to southern California *californica* Mannerheim
 - Elytron with scutellar spot and at least traces of other spots 7
- 7(6). Pale area on each side of pronotum extending almost to posterior pronotal angle, deeply penetrating dark discal area inwardly; anterior margin of pronotum sometimes entirely pale, sometimes dark at middle *prolongata prolongata* Crotch
 - Pale area of pronotum smaller, not extending beyond basal $\frac{1}{2}$, not penetrating dark discal area to an unusual depth; anterior margin of pronotum black at middle 8
- 8(7). Each elytron with 2 moderately large spots in addition to scutellar spot, lacking humeral spot (Fig. 652f); high elevations, Alberta to Utah, and Fresno and Mono Cos., California *alta* Brown
 - Elytral spots small, usually more numerous, the humeral spot usually present (Fig. 645). Occurring near the Pacific coast, southern Alaska to southern California *johnsoni* Casey
- 9(3). Head pale except for black band across base (male); or dark and with broad pale band between eyes, band rarely interrupted medially (female) 10
 - Head dark with 2 well-separated spots on front 11
- 10(9). Elytron with 3 well-developed transverse fasciae, median and subapical fasciae interrupted at suture (Fig. 639f); Newfoundland to New Jersey, New Mexico, California, and Alaska *trifasciata perplexa* Mulsant
 - Elytral markings variably reduced (Fig. 639g-j); southwestern British Columbia to southern California *trifasciata subversa* LeConte
- 11(9). Ventral pale spot on each anterior pronotal angle small, usually subtriangular, extending posteriorly not more than $\frac{1}{2}$ as far as dorsal spot except very rarely 12
 - Ventral pale spot on pronotal angle large, usually trapezoidal, extending posteriorly as far or almost as far as dorsal spot except in some specimens of *h. kirbyi* and *u. undecimpunctata* in which the dorsal spot is narrowly prolonged to posterior pronotal angle 16
- 12(11). Elytron usually with a subbasal fascia, this sometimes reduced to a scutellar spot and small spot on each humerus or to a scutellar spot only; the sublateral spot at basal $\frac{1}{2}$ lacking when fascia is strongly reduced 13
 - Elytron never with a subbasal fascia or with spot on humerus; often with a small sublateral spot at basal $\frac{1}{2}$ 14
- 13(12). Length of males 5.0 to 7.50 mm; of females, 5.9 to 7.8 mm; elytron with median and subapical spots transversely more elongate; Newfoundland to Virginia west to California and Alaska *transversoguttata richardsoni* Brown
 - Length of males, 4.0 to 5.40 mm; of females, 4.70 to 6.0 mm; elytron always with subbasal fascia; restricted to Greenland *transversoguttata ephippiata* Zetterstedt
- 14(12). Occurring at and north of the northern limit of trees; Ungava Bay to Alaska *fulgida* Watson
 - Not occurring north of the St. Lawrence River, Quebec 15
- 15(14). Length 5.0 to 6.0 mm; tarsal claw with tooth reduced *difficilis* Crotch
 - Length 6.50 mm or more; tarsal claw with strong tooth *septempunctata* (L.)
- 16(11). Elytron with 3 transverse fasciae, the median and subapical fasciae interrupted at suture *trifasciata perplexa* Mulsant

- Elytra never trifasciate 17
- 17(16). Mesepimeron black, or pale and more or less infusate; elytron with tricusate subbasal band (Fig. 660g) in specimens with whitish mesepimeron 18
- Mesepimeron largely or entirely white; elytron never with subbasal band 20
- 18(17). Elytron with more or less strongly tricusate subbasal band and with transverse subapical spot 19
- Elytron lacking subbasal band, with scutellar spot, frequently with 2 transverse spots, frequently with transverse spots broken into round spots or lacking entirely or in part; Vancouver Island to northern California *hieroglyphica humboldtiensis* Nunenmacher
- 19(18). Subbasal band on elytron strongly tricusate (Fig. 660g); anterior margin of pronotum frequently entirely pale; Nova Scotia and New Hampshire to Montana, central British Columbia, and Yukon Territory *hieroglyphica kirbyi* Crotch
- Subbasal band on elytron less strongly or feebly tricusate (Fig. 660f); anterior margin of pronotum broadly dark at middle; subarctic, Alaska to northernmost Manitoba *hieroglyphica mannerheimii* Mulsant
- 20(17). Elytron usually with 4 small, round spots in addition to a humeral and scutellar spot, the 2 submedian spots sometimes joined, the outer apical or the humeral spot sometimes lacking (Fig. 657f) *undecimpunctata undecimpunctata* L.
- Elytral spots less numerous and, except for scutellar spot, entirely lacking in some western specimens, elytron in eastern and northern specimens with large, oblique spot near middle and large subapical spot, humeral spot always lacking (Fig. 658f, g) *monticola* Mulsant

Coccinella trifasciata perplexa Mulsant

Fig. 639a–f; Map, Fig. 640

Coccinella perplexa Mulsant, 1850, p. 1022.—Casey, 1899, p. 89.—Johnson, 1910, p. 57.

Coccinella trifasciata: Mulsant, 1850, p. 119 (in part); Mulsant, 1866, p. 98 (in part); Crotch, 1873, p. 370 (in part); Wickham, 1894, p. 301.—Bowditch, 1902, p. 205.—Leng, 1903b, p. 200.—Blatchley, 1910, p. 514.—Dobzhansky, 1931, p. 22.—Dobzhansky, 1933, p. 111.—Wingo, 1952, p. 46.—Belicek, 1976, p. 331.

Coccinella eugenii Mulsant, 1866, p. 95 (see entries under *Coccinella trifasciata subversa* LeC.).

Coccinella trifasciata perplexa: Hatch, 1961, p. 179.—Brown, 1962, p. 787.

Diagnosis. Length 4.0 to 5.0 mm. Head pale except for black band across base (male) or black with 2 pale spots (female); pronotum with anterior margin usually pale, ventral pale spot large, extending posteriorly as far as dorsal spot; elytron with 3 transverse black fasciae as in Figure 639f. Male genitalia as in Figure 639a–d. Female genitalia as in Figure 639e.

Discussion. The nominate subspecies is Eurasian and it was separated from *perplexa* in a key by Brown (1962, p. 788). The elytral color pattern is usually sufficient to distinguish this subspecies.

Type locality. “Amerique boreale.”

Type depository. Not located, perhaps in DLM.

Distribution. Figure 640. Labrador to New Jersey, west to Alaska and California.

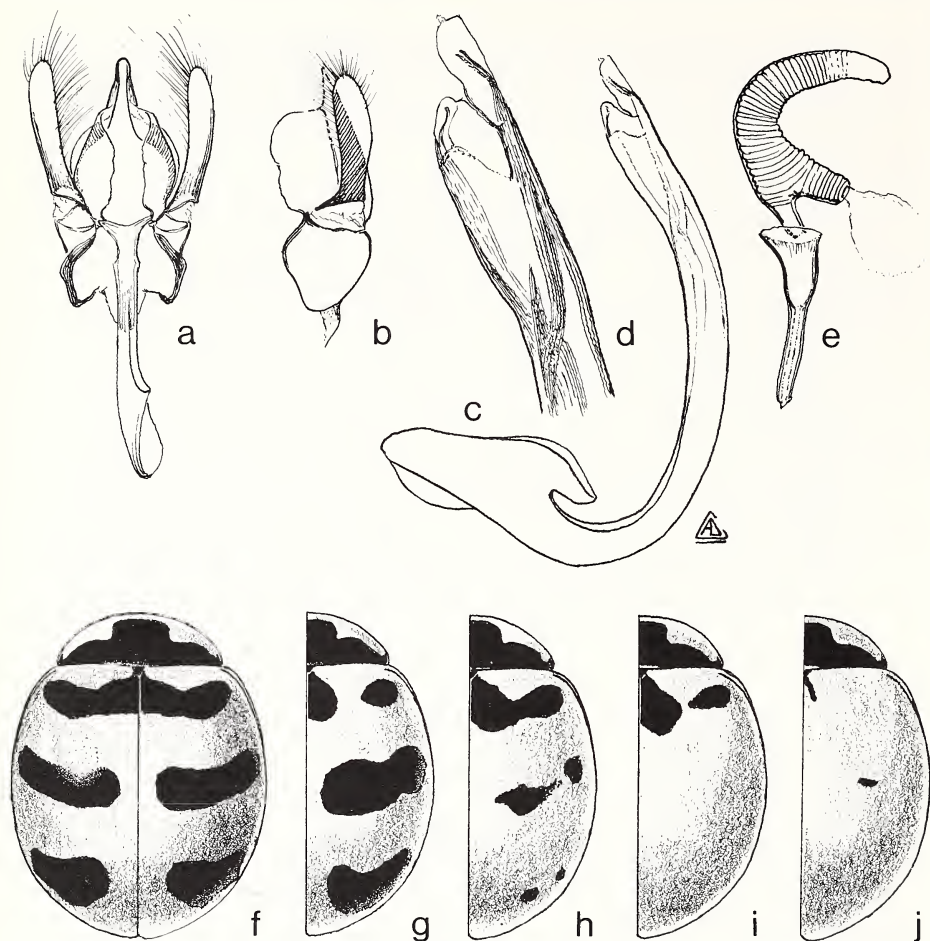


Fig. 639. *Coccinella trifasciata trifasciata*; *C. t. subversa*.

Coccinella trifasciata subversa LeConte

Fig. 639g-j; Map, Fig. 640

Coccinella subversa LeConte, 1854, p. 19.—Crotch, 1874b, p. 116.

Coccinella trifasciata subversa: Crotch, 1873, p. 370.—Leng, 1903b, p. 200.—Dobzhansky, 1931, p. 23.—Hatch, 1961, p. 179.—Brown, 1962, p. 789.

Coccinella trifasciata ab. subversa: Korschevsky, 1932, p. 499.—Mader, 1936, p. 375.

Coccinella perplexa subversa: Johnson, 1910, p. 57.

Coccinella juliana Mulsant, 1856, p. 141.—Casey, 1899, p. 89.

Coccinella trifasciata juliana: Crotch, 1873, p. 370.—Crotch, 1874b, p. 115.—Leng, 1903b, p. 200.—Dobzhansky, 1931, p. 25.

Coccinella trifasciata ab. juliana: Mader, 1930, p. 163.—Korschevsky, 1932, p. 499.

Coccinella perplexa juliana: Johnson, 1910, p. 57.



Fig. 640. Distribution. *Coccinella trifasciata trifasciata* (shaded); *C. t. subversa* (cross hatch).

Coccinella barda LeConte, 1860, p. 286.

Coccinella eugenii Mulsant, 1866, p. 95.—Crotch, 1874b, p. 115.—Casey, 1899, p. 90.

Coccinella trifasciata eugenii: Crotch, 1873, p. 370.—Leng, 1903b, p. 200.—Dobzhansky, 1931, p. 24.

Coccinella trifasciata ab. *eugenii*: Korschefsky, 1932, p. 499.—Mader, 1936, p. 375.

Coccinella perplexa fennica: Johnson, 1910, p. 57.

Coccinella trifasciata ab. *praedicta* Mader, 1930, p. 163.

Coccinella trifasciata: Dobzhansky, 1933, p. 111.

Description as for *C. t. perplexa* except head of female black with pale band between eyes; elytral maculation reduced as in Figure 639g-j. The type of *C. juliana* was supposed to have been deposited in the BMNH, but R. D. Pope has searched for it without success so it is probably lost. There are 3 specimens of *C. t. subversa* in the

LeConte collection, one of which, female bears a type label. LeConte did not state how many specimens of *C. t. subversa* he had, therefore I here designate and label the specimen labeled "(blue disc)/TYPE 6687(red paper)/*C. subversa* LeC. Cooper" as the lectotype. No types of *C. barda* exist in the LeConte collection and I presume they are no longer extant.

Type locality. Of *subversa*, Oregon (lectotype here designated); of *juliana*, California; of *barda*, Punto de los Reyes (Marin Co.), California; of *praedicta*, Alameda, California; of *eugenii*, California.

Type depository. Of *subversa* MCZ; of *barda*, type apparently lost; of *juliana*, type apparently lost; of *praedicta*, not known; of *eugenii*, not known.

Distribution. Figure 640. British Columbia to California.

Coccinella transversoguttata richardsoni Brown

Fig. 641a-g; Map, Fig. 642

Coccinella quinque-notata Kirby, 1837, p. 230 (not *Coccinella quinquenotata* Hawthorth, 1812).

Coccinella 5-notata: Fitch, 1862, p. 849.—Crotch, 1873, p. 370.—Casey, 1899, p. 89.—Palmer, 1914, p. 219.

Coccinella 5-notata interrupta Fitch, 1862, p. 851 (not *Coccinella interrupta* Fourcroy, 1785).

Coccinella transversoguttata: Mulsant, 1850, p. 117 (in part).—Mulsant, 1866, p. 97 (in part).—Crotch, 1874b, p. 116 (in part).—Wickham, 1894, p. 301.—Leng, 1903b, p. 199 (in part).—Johnson, 1910, p. 61 (in part).—Dobzhansky, 1931, p. 14.—Dobzhansky, 1935, p. 334.—Wingo, 1952, p. 46.—Hatch, 1961, p. 178.—Belicek, 1976, p. 333.

Coccinella transversoguttata transversalis: Wickham, 1894, p. 306.

Coccinella transversoguttata ab. *zetterstedti* Mader, 1930, p. 151.

Coccinella transversoguttata var. *nugatoria*: Leng, 1903b, p. 199.—Dobzhansky, 1935, p. 334.

Coccinella transversoguttata richardsoni Brown, 1962, p. 790.

Diagnosis. Length 5.0 to 7.80 mm. Head black with 2 well separated pale spots; pronotum with anterior margin black at middle, ventral pale spot small, triangular, extending posteriorly $\frac{1}{3}$ to $\frac{1}{2}$ as far as dorsal spot; elytron variable but usually with at least a subbasal fascia (Fig. 641f, g). Male genitalia as in Figure 641a-d. Female genitalia as in Figure 641e.

Discussion. This species is extremely widely distributed and commonly collected. The color pattern is nearly always sufficient for recognizing *C. t. richardsoni*. The unique type (holotype) of *C. quinquenotata* is a female labeled "Type (white disc with red border)/N. Amer 5961 a./*Coccinella 5-notata* Kirby n. america 5961. Rev. W. Kirby."

Type locality. Of *quinquenotata*, North America; of *interrupta*, New York; of *zetterstedti*, Lapland and Canada.

Type depository. Of *quinquenotata*, BMNH; of *interrupta*, not known; of *zetterstedti*, not known.

Distribution. Figure 642. Labrador to Virginia, west to Alaska and California.

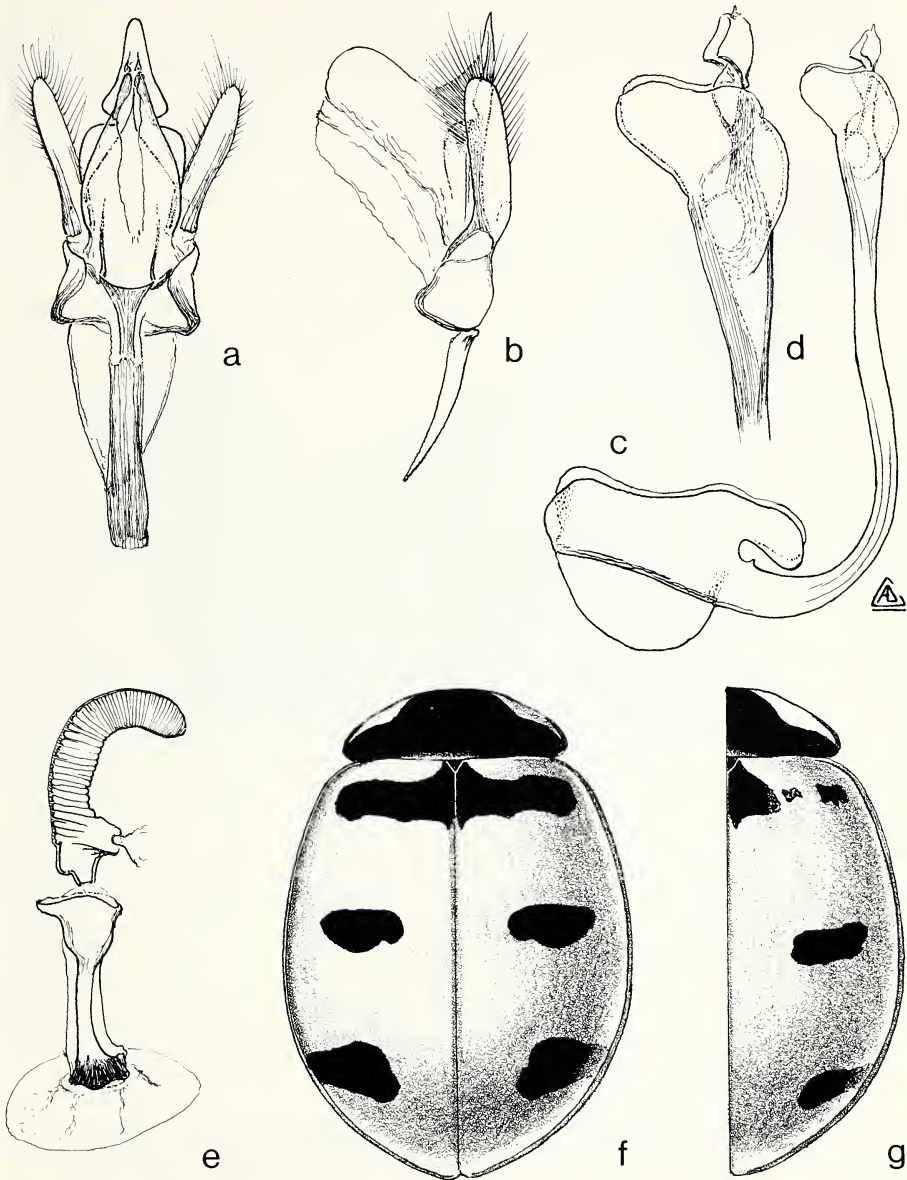


Fig. 641. *Coccinella transversoguttata richardsoni*.

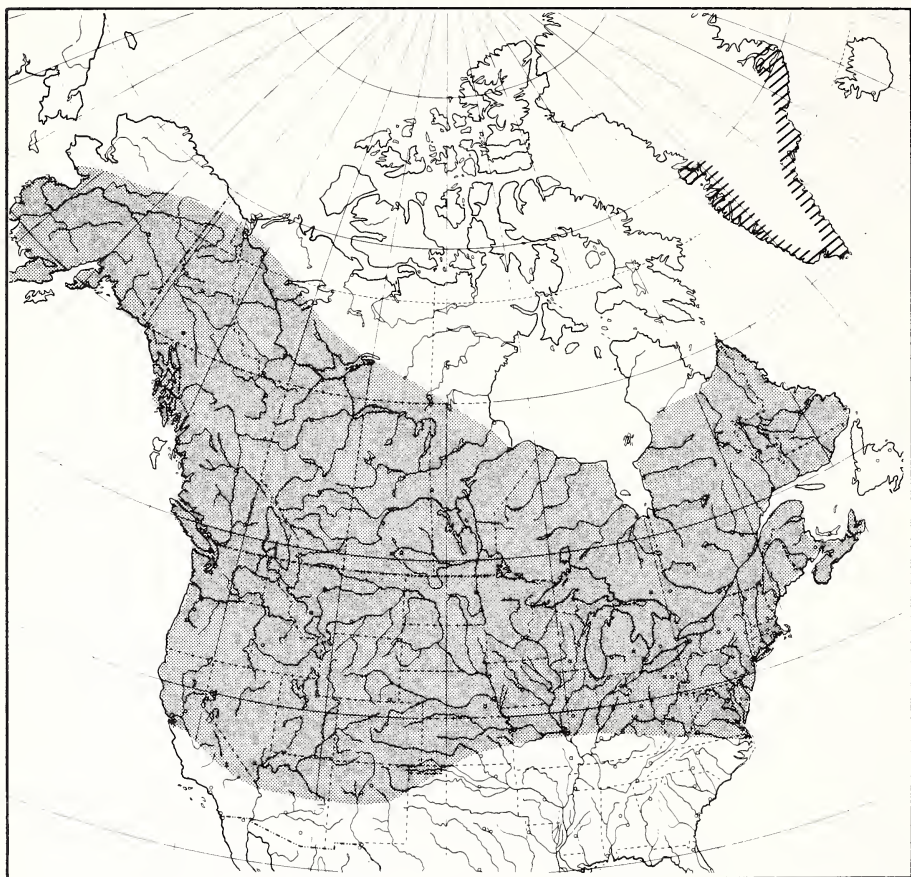


Fig. 642. Distribution. *Coccinella transversoguttata richardsoni* (shaded); *C. t. ephippiata* (cross hatch, Greenland).

Coccinella transversoguttata ephippiata Zetterstedt
Map, Fig. 642

Coccinella ephippiata Zetterstedt, 1838, p. 186.

Coccinella trifasciata: Fabricius, 1780, p. 186.

Coccinella transversoguttata: Mulsant, 1850, p. 117 (in part).—Crotch, 1874b, p. 116 (in part).—Henriksen and Lundbeck, 1918, p. 515.—Henriksen, 1939, p. 45.

Smaller than *C. t. transversoguttata* and *C. t. richardsoni*; length of males, 4.10 to 5.40 mm, the average about 5.0 mm; length of females, 4.70 to 6.0 mm, the average about 5.4 mm. Elytron maculate as in *C. t. transversoguttata*; the subbasal band never broken or reduced; the median and subapical spots less elongate transversely than in *C. t. richardsoni*; the sublateral spot present in 90 per cent of the specimens, well-developed or quite distinct in 12 per cent, very small or rather indistinct in 8

per cent. Male genitalia much as in the allied forms; the hastate, apical portion of the median lobe less variable than in the others, more slender than in *C. t. transversoguttata* or in some specimens of *C. t. richardsoni*.

Type locality. Greenland.

Type depository. Type not located.

Distribution. Figure 642. Greenland.

Coccinella californica Mannerheim

Fig. 643a–g; Map, Fig. 649

Coccinella californica Mannerheim, 1843, p. 312.—Mulsant, 1850, p. 110.—Mulsant, 1866, p. 91.—Casey, 1899, p. 88.—Johnson, 1910, p. 62.—Dobzhansky, 1931, p. 11.—Wingo, 1952, p. 46.—Hatch, 1961, p. 178.—Brown, 1962, p. 793.—Belicek, 1976, p. 335.

Coccinella 5-notata californica: Crotch, 1873, p. 370.

Coccinella transversoguttata californica: Crotch, 1874b, p. 116.—Weise, 1892, p. 25.—Leng, 1903b, p. 200.

Coccinella transversoguttata ab. californica: Mader, 1930, p. 151.

Coccinella californica melanocollis Johnson, 1910, p. 62.

Coccinella transversoguttata ab. melanocollis: Korschefsky, 1932, p. 496.—Mader, 1936, p. 374.

Diagnosis. Length 5.10 to 6.80 mm. Head black with 2 well separated pale spots (Fig. 643g); pronotum with anterior margin black at middle, ventral pale spot elongate, triangular, extending posteriorly $\frac{2}{5}$ to $\frac{3}{4}$ as far as dorsal spot; elytron with small scutellar spot, sutural margin very narrowly dark brown (Fig. 643f). Male genitalia as in Figure 643a–d. Female genitalia as in Figure 643e.

Discussion. As noted by Brown (1962), *C. californica* is most closely related to *C. johnsoni*, but is most likely to be confused with the immaculate form of *C. novemnotata*. The latter species has the interocular region and the anterior pronotal margin entirely pale. This species has been recorded from Oklahoma, Iowa and Missouri (Wingo, 1952; Brown, 1962) but was probably carried there by commerce. Brown stated that *C. californica* probably does not breed east of the low region adjacent to the Pacific Coast. There are 3 types of *C. californica* in Helsinki, one of which, a female, labeled “Eschsch./California/coll. Mannerh./California Eschsch” I here designate and label as the lectotype, the other 2 specimens as paralectotypes.

Type locality. Of *californica*, California (lectotype here designated); of *melanocollis*, Berkley, California.

Type depository. Of *californica*, UMZH; of *melanocollis*, no type designated.

Distribution. Figure 649. British Columbia to California.

Coccinella johnsoni Casey

Fig. 645; Map, Fig. 644

Coccinella johnsoni Casey, 1908, p. 403.—Johnson, 1910, p. 61.—Dobzhansky, 1931, p. 13.—Hatch, 1961, p. 177.—Brown, 1962, p. 794.—Belicek, 1976, p. 336 (as a synonym of *C. californica*).

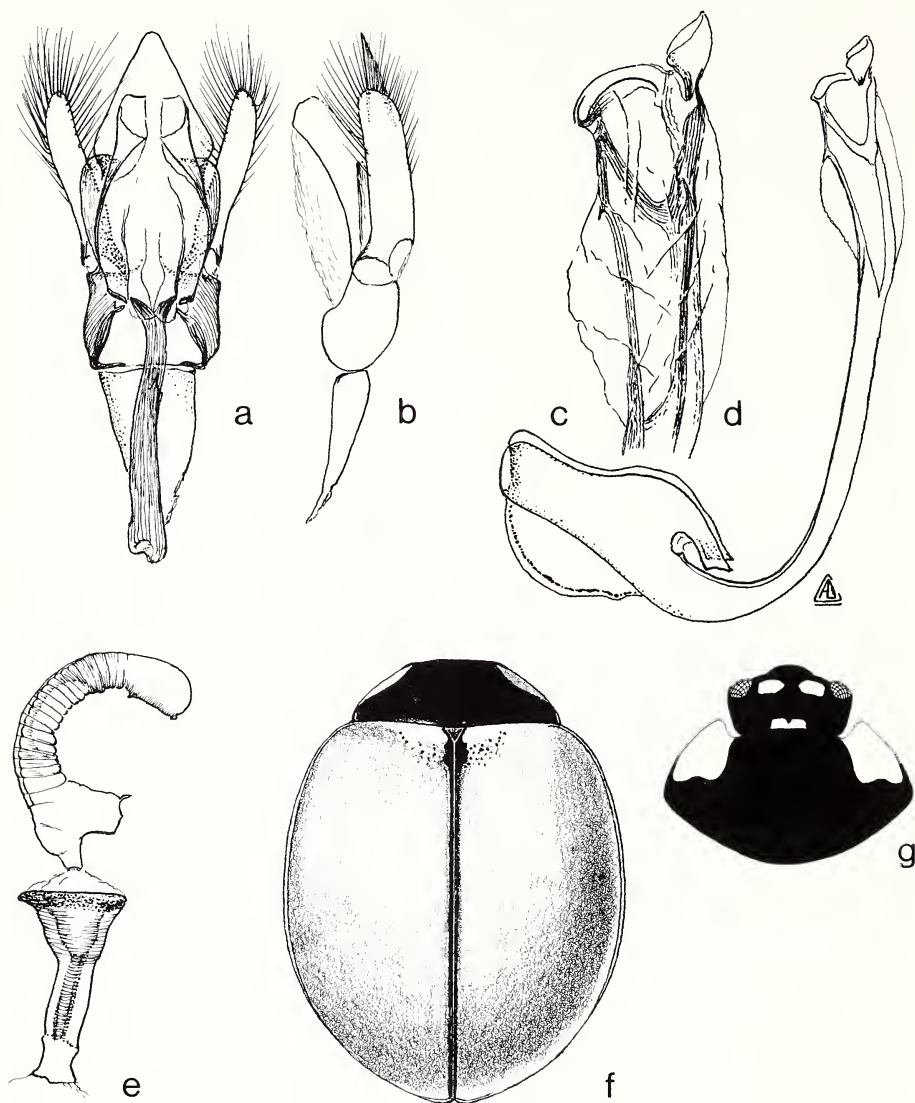


Fig. 643. *Coccinella californica*.

Coccinella novemnotata johnsoni: Leng, 1920, p. 216.

Coccinella novemnotata ab. *johnsoni*: Korschefsky, 1932, p. 512.

Differs from *C. californica* only in having elytral maculae as in Figure 645. *Coccinella johnsoni* is likely to be confused only with some western forms of *C. novemnotata* (see remarks under *C. californica*). The name *johnsoni* is based on a single female in the Casey collection (holotype).



Fig. 644. Distribution. *Coccinella johnsoni* (cross hatch, west coast); *C. novemnotata*.

Type locality. San Diego, California.

Type depository. USNM (35517).

Distribution. Figure 644. Alaska to southern California.

Coccinella septempunctata (L.)

Fig. 646a-e; Map, Fig. 649

Coccinella 7-punctata L., 1758, p. 365.

Coccinella septempunctata: Mulsant, 1846, p. 79.—Mulsant, 1850, p. 115.—Crotch, 1874b, p. 117.—Dobzhansky, 1926a, p. 17.—Hoebeker and Wheeler, 1980, p. 209.

Coccinella (Coccinella) septempunctata: Iablokoff-Khnzorian, 1982, p. 370.

Diagnosis. Length 6.50 to 7.80 mm. Head black with 2 well separated pale spots; pronotum with anterior margin black at middle with ventral pale spot small, extending posteriorly $\frac{1}{3}$ as far as dorsal spot; elytron with 3 black spots in addition to

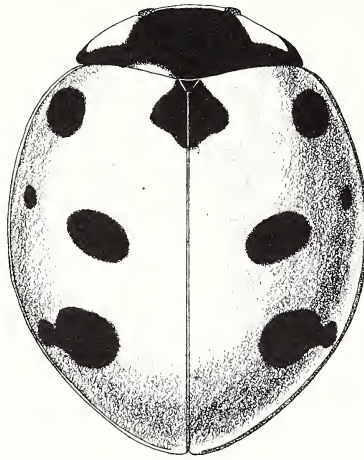


Fig. 645. *Coccinella johnsoni*.

scutellar spot (Fig. 646e). Male genitalia as in Figure 646a–c. Female genitalia as in Figure 646d.

Discussion. This widespread palearctic species was intentionally introduced into North America several times from 1956 to 1971 for biological control of aphids. All of those attempts apparently failed in getting *C. septempunctata* established, but in 1973 an established population was found in Bergen Co., New Jersey. This population is thought to have been the result of an accidental introduction rather than a purposeful one (Angalet and Jacques, 1975). Since 1973, this species has spread naturally and been colonized and established in Delaware, Georgia, and Oklahoma. It is also widely distributed in Maine (R. Dysart, pers. comm), but I have not seen any specific locality data for that state. References with published data on spread and release are: Angalet and Jacques (1975); Angalet et al. (1979); Cartwright et al. (1979); Tedders and Angalet (1981); and Hoebeke and Wheeler (1980). *Coccinella septempunctata* is established in Quebec as the result of either an accidental introduction or spread from Maine releases. Locality data listed here is from Larochelle (1979). This species goes to *C. difficilis* in Brown's key (1962), but *C. septempunctata* is much larger and as yet does not occur in the same geographic region as *C. difficilis*. Korschefsky (1932) presents a complete synonymy of the many names associated with this species.

Type locality. "Suecica".

Type depository. Type not examined.

Distribution. Figure 649. QUEBEC: Berthier Parish, Berthierville, Lanoraie, Saint-Jean-de-Matha; Chambly Parish, Saint-Bruno; Chateaugay Parish, Saint-Chrysostome; Ile de Montreal, Dorval, Montreal, Montreal-Nord; L'Assumption Parish, La Plaine, Repentigny; Portneut Parish, Saint-Augustin; Sainte-Maurice Parish, Trois-Rivieres; Terrebonne Parish, Terrebonne; Vaudreuil Parish, Pincourt, Rigaud. CONNECTICUT: Fairfield Co.; New Haven Co.; Hammonasset State Park; Middlesex Co.; New London Co. DELAWARE: Kent Co.; Newcastle Co.; Sussex Co. GEORGIA: Peach Co., Byron; Houston Co., Baconton. NEW JERSEY: Bergen Co.;

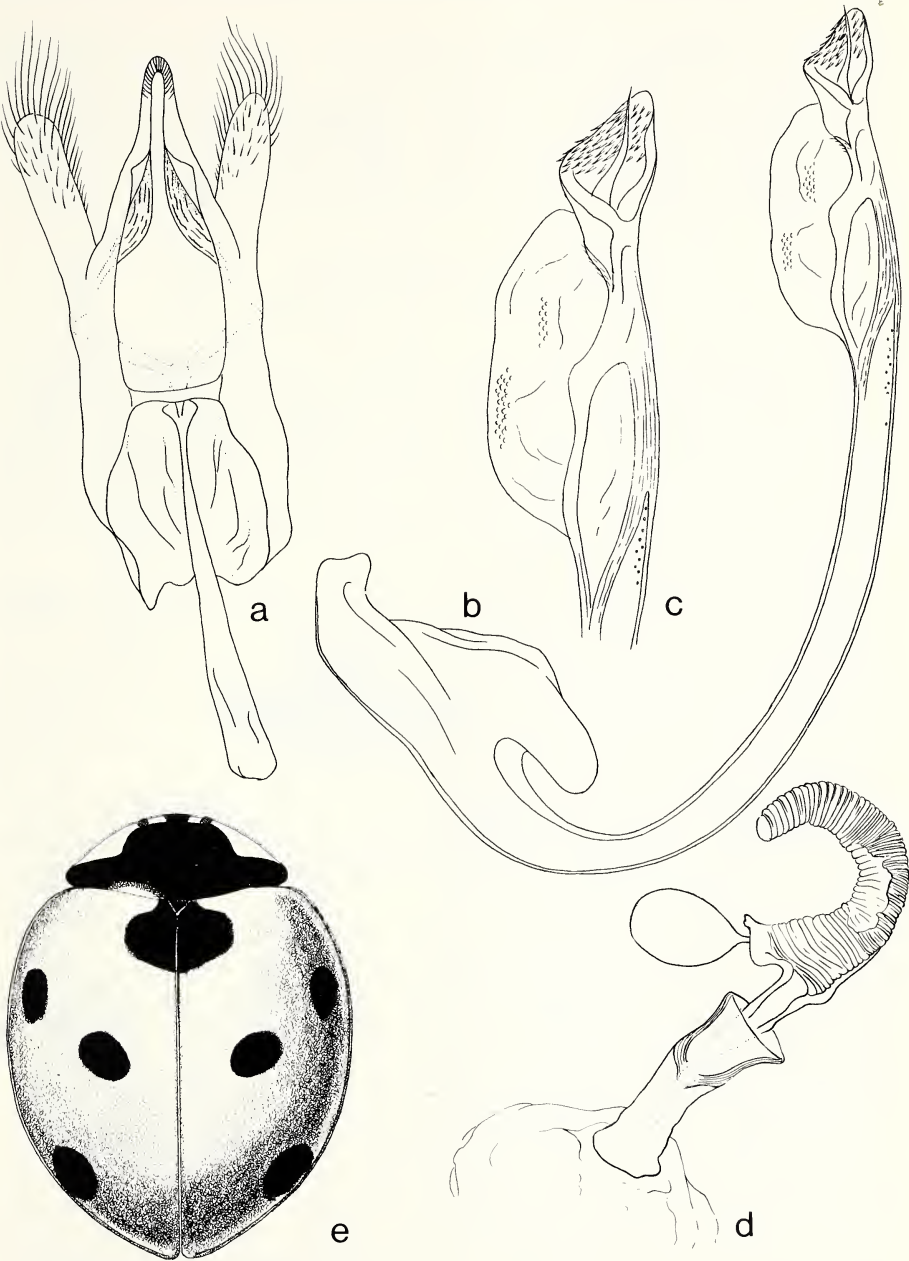


Fig. 646. *Coccinella septempunctata*.

Essex Co., Gloucester Co.; Hunterdon Co.; Mercer Co.; Middlesex Co.; Monmouth Co.; Morris Co.; Passaic Co.; Salem Co.; Somerset Co.; Union Co.; Warren Co. NEW YORK: Bronx Co.; Brooklyn Co.; Far Rockaway; Flushing; Ithaca; Nassau Co., Malverne; Orange Co.; Putnam Co.; Queens Co., Rochdale; Richmond Co.; Rockland Co.; Suffolk Co.; Tompkins Co., Freeville; Ulster Co.; Westchester Co. OKLAHOMA: Payne Co. PENNSYLVANIA: Berks Co., Leesport; Bucks Co., Hilltown; Columbia Co., Catawissa; Lehigh Co., Allentown; Pike Co., Bushkill.

Coccinella novemnotata Herbst
Fig. 647a–h, 648; Map, Fig. 644

Coccinella 9-notata Herbst, 1793, p. 269.—Fabricius, 1798, p. 78.—Fabricius, 1801, p. 366.—Mulsant, 1850, p. 123.—Mulsant, 1866, p. 99.—Fitch, 1862, p. 106.—Crotch, 1873, p. 370.—Crotch, 1874b, p. 117.—Wickham, 1894, p. 301.—Casey, 1899, p. 88.—Bowditch, 1902, p. 205.—Leng, 1903b, p. 198.—Blatchley, 1910, p. 514.—Johnson, 1910, p. 59.—Palmer, 1914, p. 226.—Dobzhansky, 1931, p. 4.—Korschefsky, 1932, p. 512.—Dobzhansky, 1933, p. 111.—Wingo, 1952, p. 46.—Brown, 1962, p. 794.—J. Chapin, 1974, p. 61.—Belicek, 1976, p. 334.

Coccinella franciscana Mulsant, 1853, p. 147.

Coccinella 9-notata franciscana: Crotch, 1873, p. 370.—Leng, 1903b, p. 198.—Johnson, 1910, p. 59.—Dobzhansky, 1931, p. 111.

Coccinella novemnotata inaequalis Fitch, 1862, p. 107.

Coccinella novemnotata ab. *parvamaculata* Fitch, 1862, p. 107.

Coccinella novemnotata conjuncta Fitch, 1862, p. 107.

Coccinella novemnotata ab. *confluenta* Fitch, 1862, p. 107.

Coccinella novemnotata ab. *divisicollis* Fitch, 1862, p. 107.

Coccinella degener Casey, 1899, p. 88.

Coccinella novemnotata degener: Leng, 1903b, p. 198.—Casey, 1908, p. 404.—Johnson, 1910, p. 59.—Leng, 1920, p. 216.—Dobzhansky, 1931, p. 6.—Dobzhansky, 1933, p. 112.—Hatch, 1961, p. 177.

Coccinella novemnotata oregona Casey, 1908, p. 403.—Dobzhansky, 1931, p. 7.

Diagnosis. Length 4.70 to 7.0 mm. Head with broad, pale band between eyes, black anteriorly and posteriorly (Fig. 647e); pronotum with anterior margin entirely pale, ventral pale spot large, trapezoidal, extending posteriorly as far as dorsal spot; elytron with black spots that decrease in size and number until only the scutellar spot remains in some specimens, suture narrowly blackish (Fig. 647f–h). Male genitalia as in Figure 647a–d. Female genitalia as in Figure 648.

Discussion. This species is extremely widespread in North America and is commonly collected. The pale anterior pronotal margin and blackish sutural margin of the elytron distinguish *C. novemnotata* from other species of *Coccinella*. There are 6 types of *C. degener* in the Casey collection, one of which, a male, I designate and label as the lectotype, the remaining 5 as paralectotypes. There are no specimens of *C. oregona* now in the Casey collection, but it is apparent from the original description that he had only one specimen (holotype). There are 2 types of *C. franciscana* in the Crotch collection, one of which, a female, labeled "Type (blue paper)/Type francis-

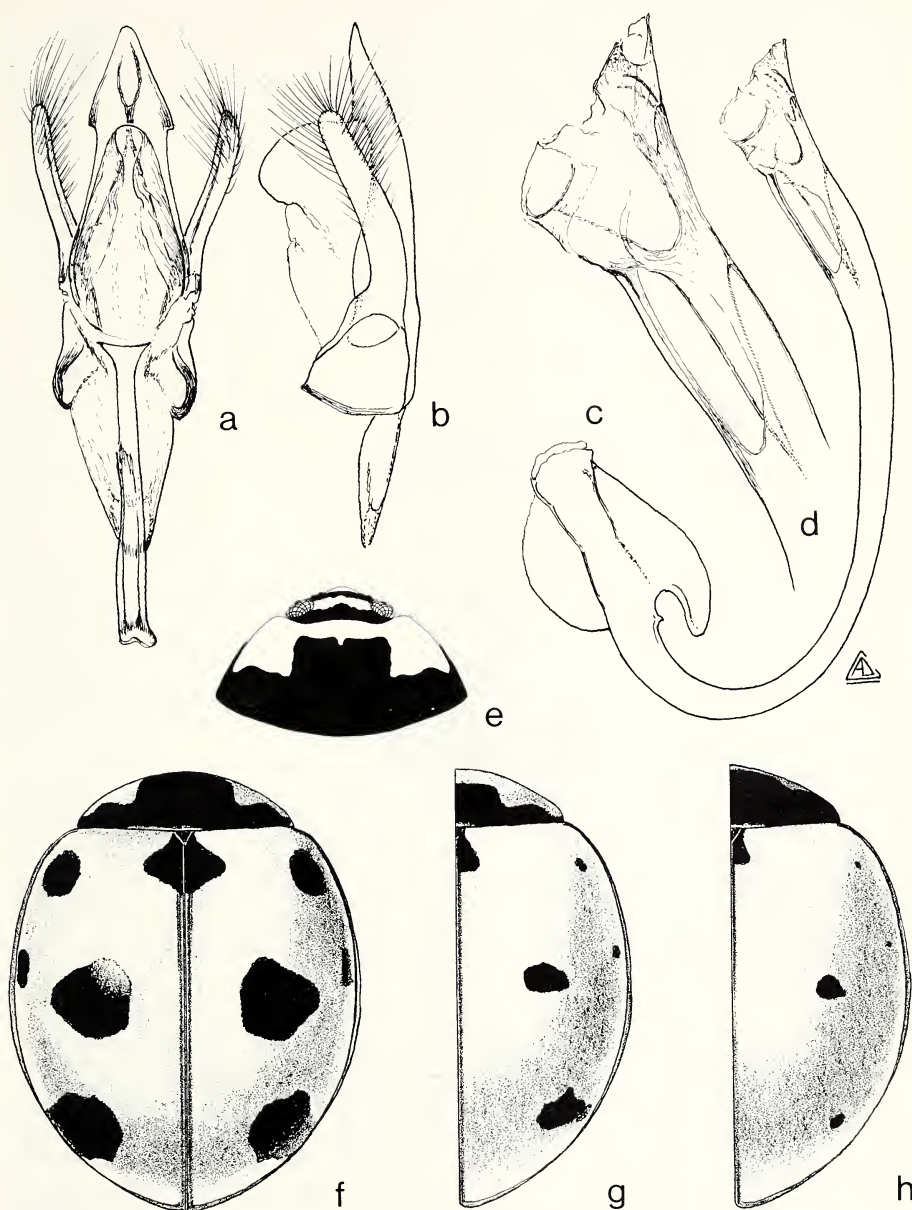


Fig. 647. *Coccinella novemnotata*.

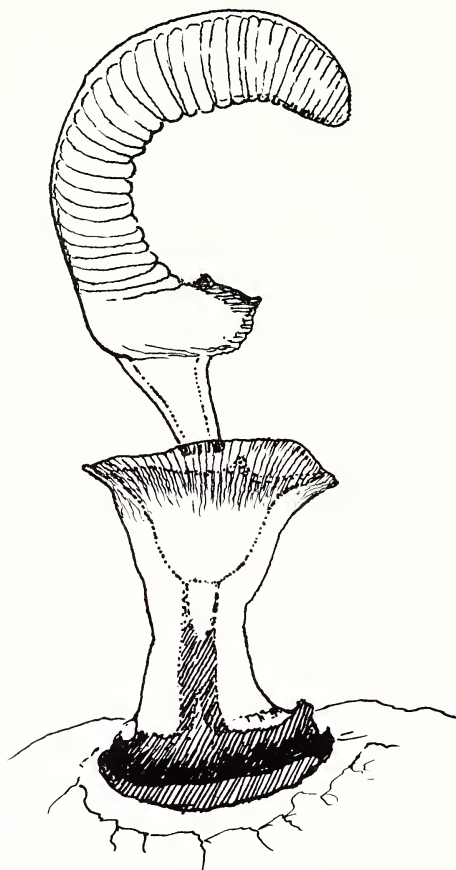


Fig. 648. *Coccinella novemnotata* (female genitalia).

cana Chevrol." I here designate and label as the lectotype, the other specimen as a paralectotype.

Type locality. Of *novemnotata*, North America; of *franciscana*, California (lectotype here designated); of *inaequalis*, *parvamaculata*, *conjuncta*, *confluenta*, and *divisicollis*, New York; of *degener*, Fort Wingate, New Mexico; of *oregona*, southern Oregon.

Type depository. Of *novemnotata*, not known; of *franciscana*, UCCC; of *inaequalis*, *parvamaculata*, *conjuncta*, *confluenta*, and *divisicollis*, not located; of *degener* and *oregona*, USNM.

Distribution. Figure 644. Maine to Georgia, west to British Columbia and southern California.

Coccinella prolongata prolongata Crotch

Fig. 650a-f, Map, Fig. 651

Coccinella prolongata Crotch, 1873, p. 371.—Casey, 1899, p. 88.—Dobzhansky, 1931, p. 9.—Johnson, 1910, p. 64.—Hatch, 1961, p. 177.—Belicek, 1976, p. 337.

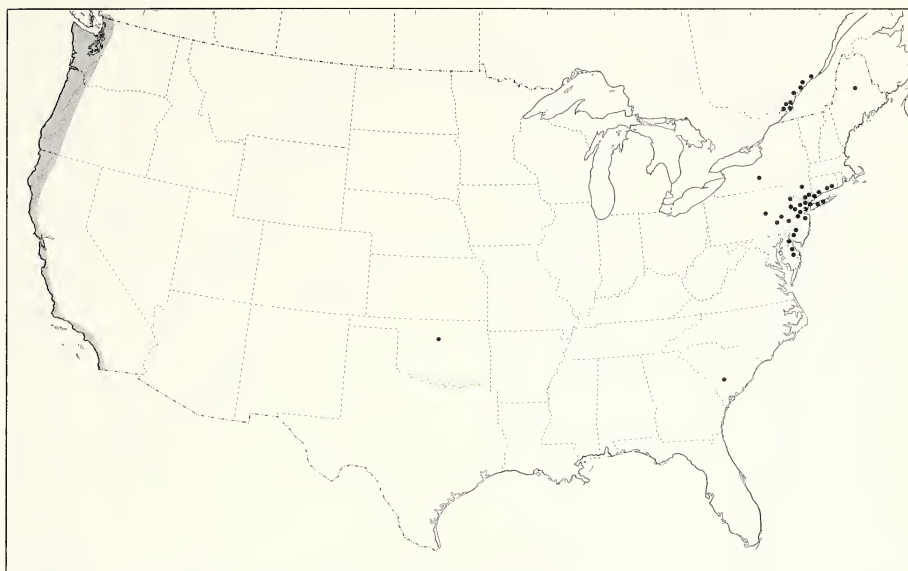


Fig. 649. Distribution. *Coccinella californica* (shaded); *C. septempunctata* (dot).

Coccinella transversoguttata var. *prolongata*: Leng, 1903b, p. 199.

Coccinella monticola prolongata: Leng, 1920, p. 216.

Coccinella prolongata prolongata: Brown, 1962, p. 797.

Diagnosis. Length 5.70 to 7.0 mm. Head black with 2 pale spots; pronotum with anterolateral pale spot larger than in any other species, ventral spot extending posteriorly $\frac{2}{3}$ to $\frac{3}{4}$ as far as dorsal spot; elytron with 2 black spots and a scutellar spot, suture narrowly darkened (Fig. 650f). Male genitalia as in Figure 650a–d. Female genitalia as in Figure 650e.

Discussion. There are 8 specimens in the LeConte collection in the MCZ under this name, the first of which bears a “type” label; therefore I designate and label this specimen labeled “(green disc)/4625/Type 8243(red paper)” as the lectotype.

Type locality. Kansas (lectotype here designated).

Type depository. MCZ.

Distribution. Figure 651. BRITISH COLUMBIA: Aspen Grove; Nicola; Oliver; Osoyoos; Vernon. CALIFORNIA: Siskiyou Co. COLORADO: Boulder; Clear Creek; Denver; Garland; Rabbit Ears Pass. IDAHO: McCall; Montpelier; Paris. MONTANA: Helena. NEBRASKA: Sioux Co. NEVADA: Franktown. OREGON: Summer Lake; Upper Klamath Marsh. UTAH: Salt Lake City. WASHINGTON: Chelan; Pullman; Puyallup; Wenatchee. WYOMING: Yellowstone National Park.

Coccinella prolongata sequoiae Dobzhansky

Fig. 650g; Map, Fig. 651

Coccinella prolongata sequoiae Dobzhansky, 1931, p. 10.—Brown, 1962, p. 797.

Description as for *C. p. prolongata* except pronotal pale areas not extended to an

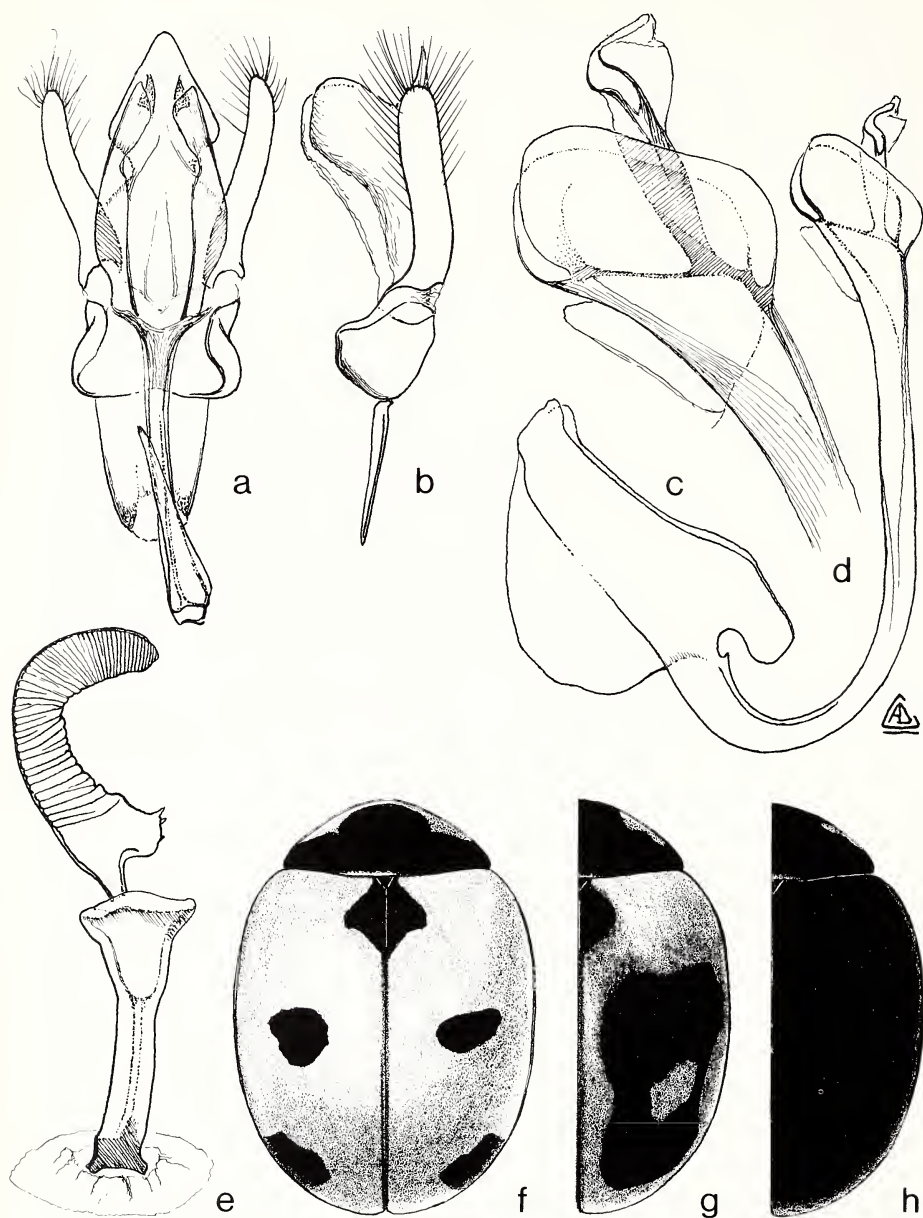


Fig. 650. f. *Coccinella prolongata prolongata*. g. *C. p. sequoiae*. h. *C. p. bridwelli*.

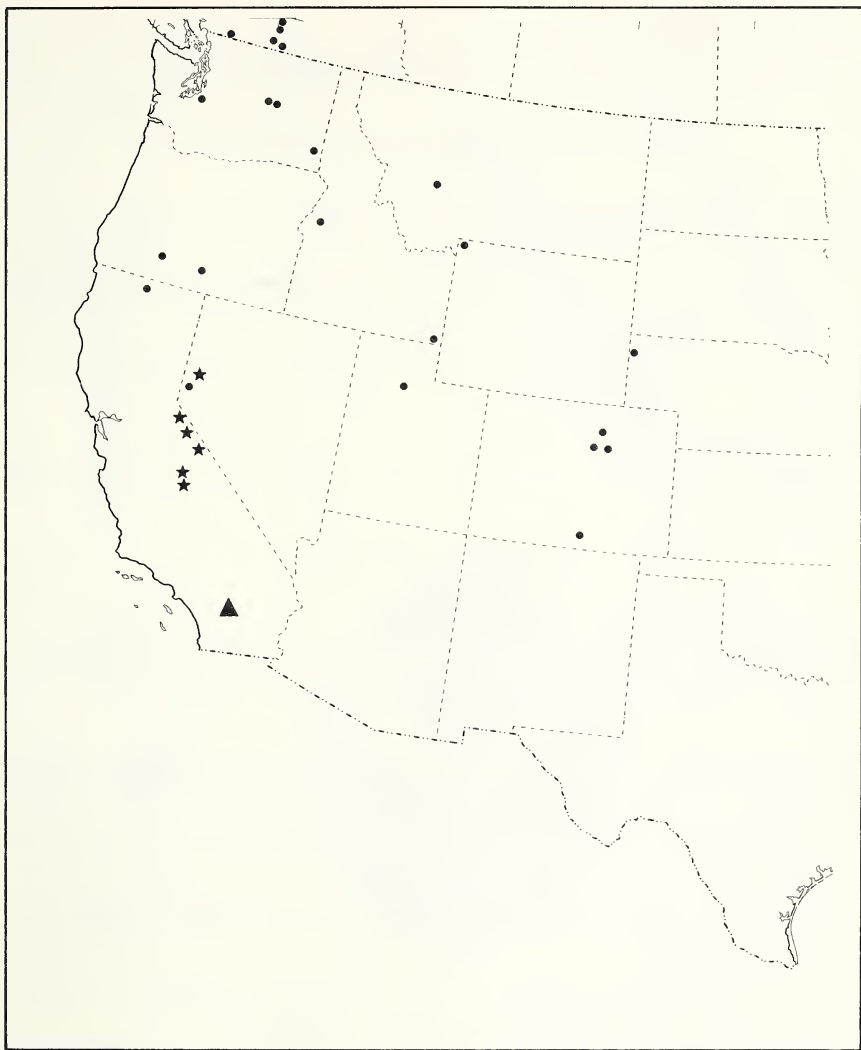


Fig. 651. Distribution. *Coccinella prolongata prolongata* (dot); *C. p. sequoiae* (star); *C. p. bridwelli* (triangle).

unusual degree; elytron with large irregular black spot enclosing small pale spot (Fig. 650g).

Dobzhansky designated 2 specimens as types, one of which, a male, I designate and label as the lectotype, the other as a paralectotype.

Type locality. Near Camp Wolverton, 7,000 to 9,000 ft., Sequoia National Park, California (lectotype here designated).

Type depository. CAS.

Distribution. Figure 651. CALIFORNIA: Alpine Co.; Inyo Co., Deep Spring Valley; Mono Co., McGee Greek; Tulare Co. NEVADA: Winemucca Lake.

Coccinella prolongata bridwelli Nunenmacher

Fig. 650h; Map, Fig. 651

Coccinella bridwelli Nunenmacher, 1913, p. 76.—Leng, 1920, p. 216.

Coccinella prolongata bridwelli: Dobzhansky, 1931, p. 11.—Brown, 1962, p. 798.

Description as for *C. p. sequoiae* except elytron entirely black (Fig. 650h). There are 2 type specimens of *C. p. bridwelli* in the CAS, one of which, a male, I designate and label as the lectotype, the other as a paralectotype.

Type locality. Tahquitz Valley, San Jacinto Mountains, California (lectotype here designated).

Type depository. CAS.

Distribution. Figure 651. CALIFORNIA: Riverside Co., San Jacinto Mts., Idyllwild, Santa Rosa Peak.

Coccinella alta Brown

Fig. 652a–f; Map, Fig. 653

Coccinella alta Brown, 1962, p. 798.—Belicek, 1976, p. 332.

Coccinella suturalis Casey, 1899, p. 89.—Dobzhansky, 1931, p. 21.—Brown, 1962, p. 798.—Belicek, 1976, p. 332 (not *Coccinella suturalis* Olivier, 1791).

Coccinella monticola var. *suturalis*: Leng, 1903b, p. 198.

Diagnosis. Length 4.80 to 5.30 mm. Head black with well separated pale spots; pronotum with anterior margin black at middle, ventral pale spot small, triangular, extending posteriorly $\frac{1}{3}$ to $\frac{1}{2}$ as far as dorsal spot; elytron with sutural margin blackish, 2 black spots present (Fig. 652f). Male genitalia as in Figure 652a–d. Female genitalia as in Figure 652e.

Discussion. This species most nearly resembles *monticola* which does not have the elytral suture darkened. The name *suturalis* is based on a single female (holotype) in the Casey collection.

Type locality. Of *alta*, Salt Lake Co., Utah; of *suturalis*, Colorado.

Type depository. Of *alta*, USNM; of *suturalis*, USNM (35521).

Distribution. Figure 653. ALBERTA: Morley, Mount Rae. CALIFORNIA: Fresno Co.; Kings River (Bubbs Creek Canyon), Mount Gold, Mount Kaiser; Inyo Co., Coyote Ridge; Mono Co., White Mtn.

Coccinella difficilis Crotch

Fig. 654a–f; Map, Fig. 653

Coccinella difficilis Crotch, 1873, p. 370.—Leng, 1903b, p. 200.—Johnson, 1910, p. 64.—Dobzhansky, 1931, p. 20.—Hatch, 1961, p. 178.—Brown, 1962, p. 799.

Coccinella monticola difficilis: Leng, 1920, p. 216.

Coccinella vandykei Nunenmacher, 1909, p. 161.

Coccinella transversoguttata vandykei: Leng, 1920, p. 216.

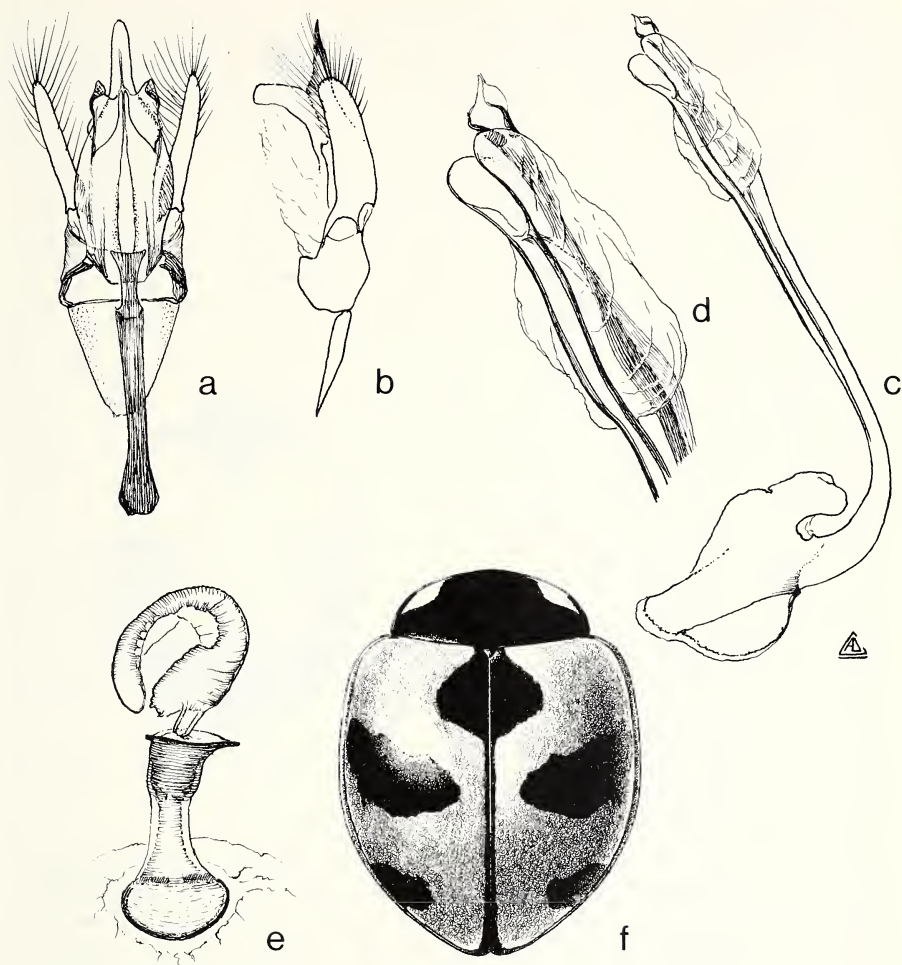


Fig. 652. *Coccinella alta*.

Diagnosis. Length 5.0 to 6.0 mm. Head black with 2 well separated pale spots; pronotum with anterior margin black at middle, ventral pale spot small, subtriangular, extending posteriorly $\frac{1}{3}$ to $\frac{3}{5}$ as far as dorsal spot; elytron as in Figure 654f, except some spots rarely lacking. Male genitalia as in Figure 654a-d. Female genitalia as in Figure 654e.

Discussion. *C. difficilis* can be confused with examples of *C. richardsoni* in which the subbasal elytral band is reduced to a scutellar spot. In such specimens the size is usually greater; the sublateral spot of each elytron is lacking; and the discal spots are transversely more elongate. There are 9 specimens under the name *C. difficilis* presently in the MCZ collection, 6 of which could possibly be type material. It is

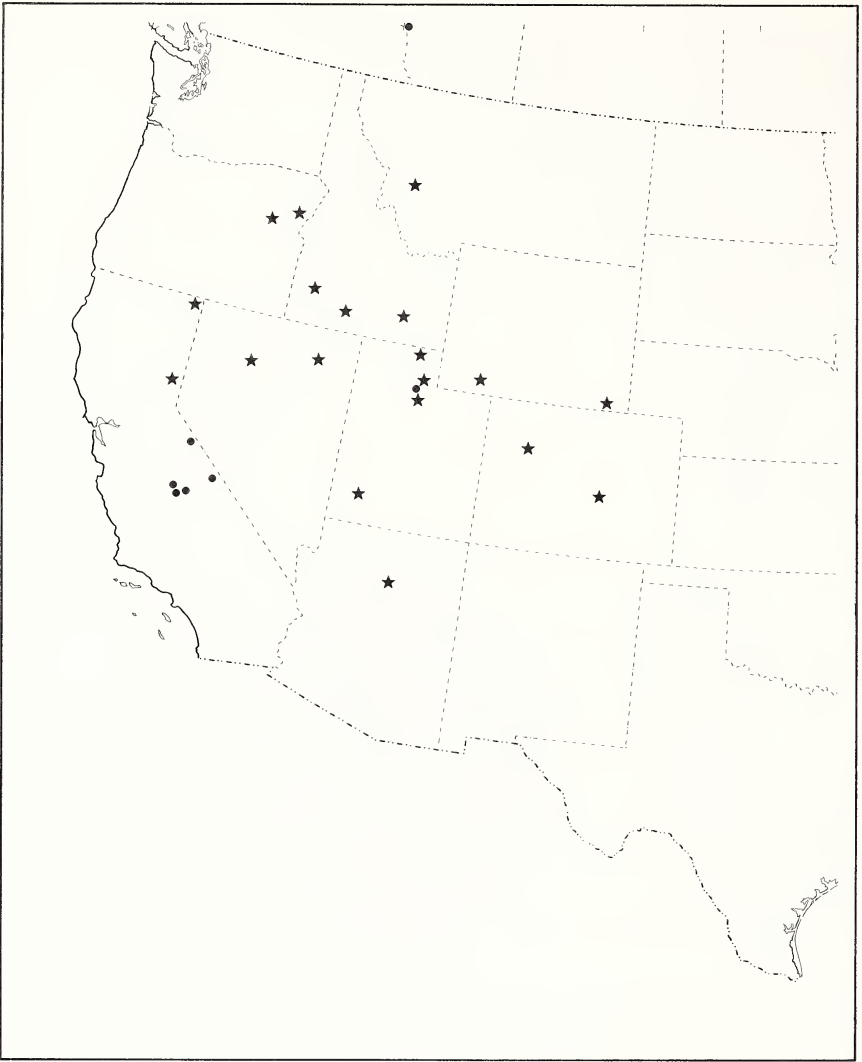


Fig. 653. Distribution. *Coccinella alta* (dot); *C. difficilis* (star).

impossible to tell from the original description how many type specimens Crotch had. Therefore I designate and label as the lectotype the first specimen (female) in the series labeled "Utah/*Coccinella difficilis*/Horn Co. H-2057/*C. difficilis* Cr." There are 2 type specimens of *C. vandykei* in the CAS, and I designate a male labeled "Goldfield/Esmeralda Co. Nev. VI. 29.07/coll'd by F. W. Nunenmacher" as the lectotype.

Type locality. Of *difficilis*, Utah (lectotype here designated); of *vandykei*, Goldfield, Nevada (lectotype here designated).

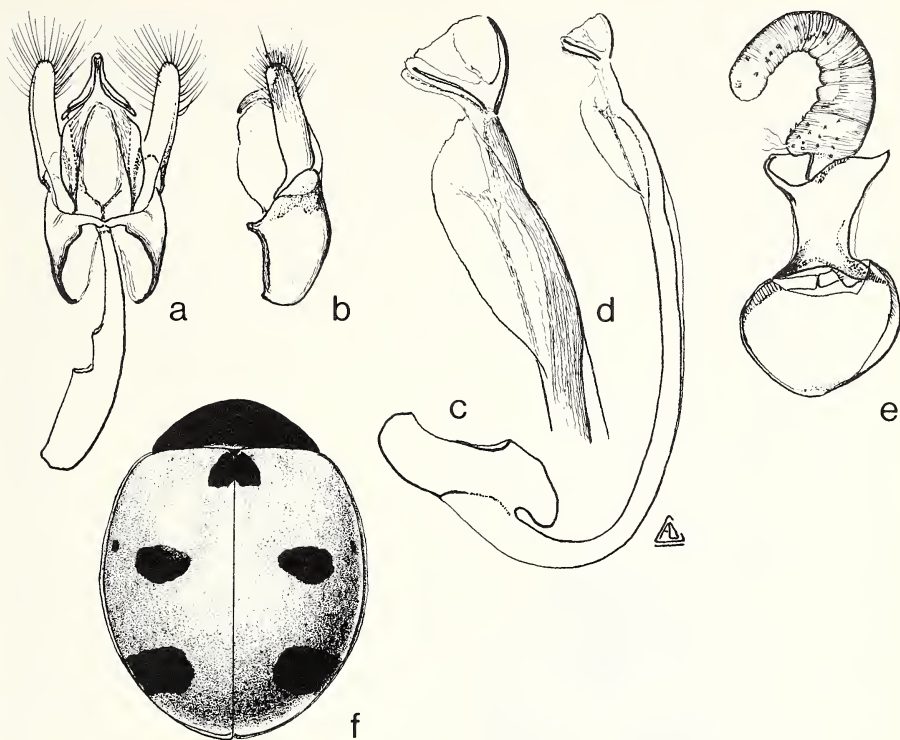


Fig. 654. *Coccinella difficilis*.

Type depository. Of *difficilis*, MCZ; of *vandykei*, CAS.

Distribution. Figure 653. ARIZONA: Flagstaff, San Francisco Mts. CALIFORNIA: Adin; Alturas, Chilcoot. COLORADO: Colorado Springs; Glenwood Springs. IDAHO: Boise; Jerome; Pocatello. MONTANA: Helena. NEVADA: Elko; Lovelock. OREGON: Grant Co.; Unity. UTAH: Fort Douglas; Logan; Milford; Salt Lake Valley. WYOMING: Cheyenne; Green River City.

Coccinella fulgida Watson

Fig. 655a–f; Map, Fig. 656

Coccinella fulgida Watson, 1954, p. 45.—Brown, 1962, p. 799.—Belicek, 1976, p. 335.

Coccinella nugatoria: Leng, 1919, p. 17 (misidentification).

Coccinella undecimpunctata: Dobzhansky, 1931, p. 28 (in part) (misidentification).—Wheeler and Hoebeke, 1981, p. 213.

Coccinella difficilis: Chapin, 1956, p. 152 (in part) (misidentification).

Diagnosis. Length 4.50 to 5.60 mm. Head black with 2 well separated pale spots; pronotum with anterior margin black at middle, ventral pale spot triangular, small,

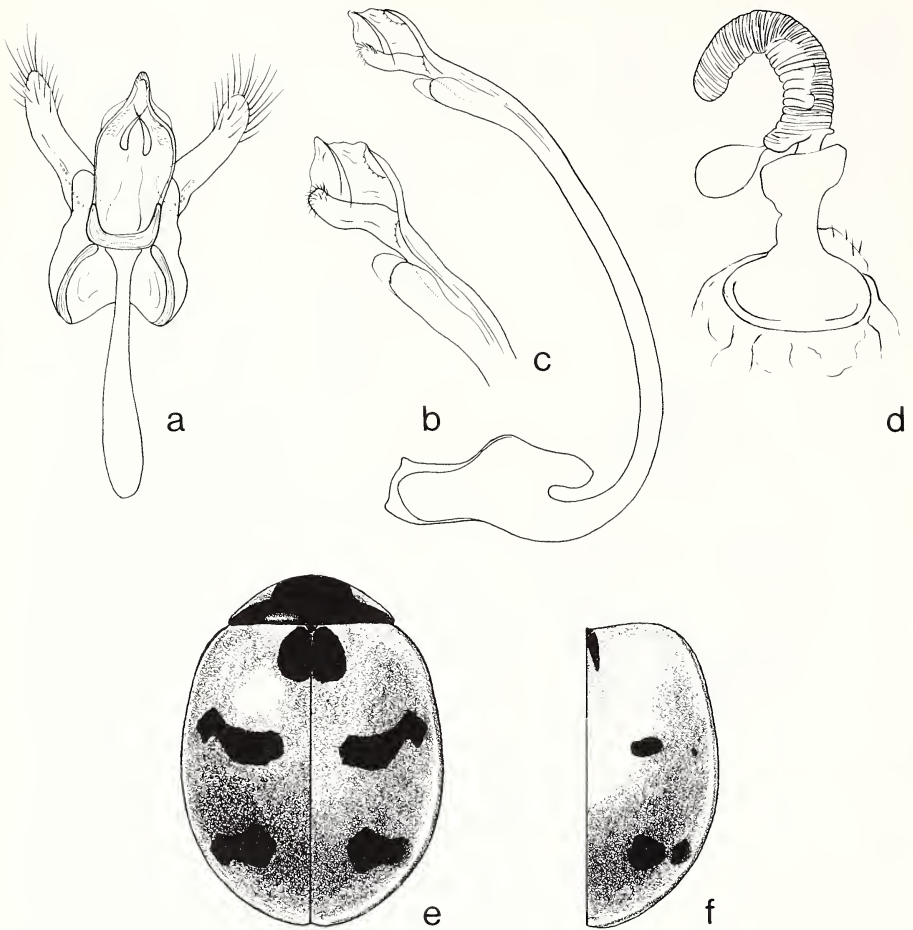


Fig. 655. *Coccinella fulgida*.

extending posteriorly $\frac{1}{5}$ to $\frac{3}{5}$ as far as dorsal spot; elytron with small subbasal spot which may be lacking or may be joined to transverse median spot, a transverse spot at apical $\frac{1}{5}$ in all specimens (Fig. 655e, f). Male genitalia as in Figure 655a-c. Female genitalia as in Figure 655d.

Type locality. Cape Henrietta Maria, north central Ontario at 55 N., 28 15 W.

Type depository. CNC.

Distribution. Figure 656. BRITISH COLUMBIA: Summit Lake. NORTHWEST TERRITORIES: Bathurst Inlet; Kater Point, Langton Bay; Reindeer Depot. QUEBEC: Fort Chimo. ALASKA: Mead River, south of Point Barrow; Rampart House, Alaska-Yukon border; Rampart House, 60 to 70 miles north; Toms Lake.



Fig. 656. Distribution. *Coccinella fulgida* (star); *C. undecimpunctata* (dot).

Coccinella undecimpunctata undecimpunctata (L.)

Fig. 657a-f; Map, Fig. 656

Coccinella 11-punctata L., 1758, p. 366.

Coccinella undecimpunctata: Schaeffer, 1912, p. 104.—Dobzhansky, 1931, p. 27 (in part).—Davis, 1932, p. 101.—Brown, 1940, p. 72.—Chapin, 1956, p. 155.—Belicek, 1976, p. 335.

Coccinella undecimpunctata undecimpunctata: Brown, 1962, p. 800.

Coccinella (*Neococcinella*) *undecimpunctata*: Savoyskaya, 1969, p. 104.—Iablokoff-Khnzorian, 1982, p. 357.

Diagnosis. Length 4.0 to 5.0 mm. More elongate and less convex than any other species of *Coccinella*. Head black with 2 well separated pale spots; pronotum with anterior margin black at middle, ventral pale spot large, extending posteriorly nearly

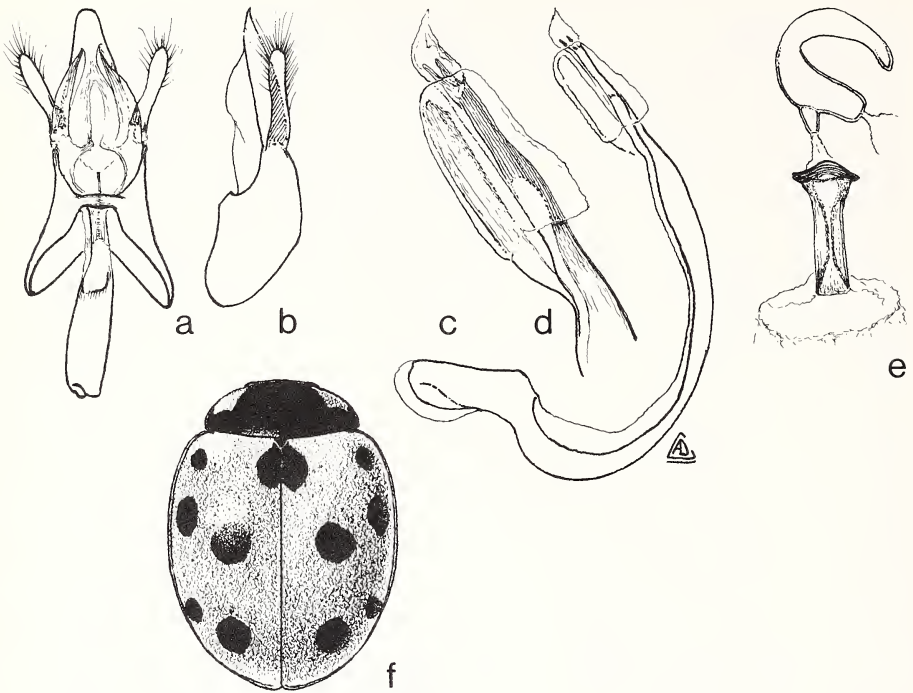


Fig. 657. *Coccinella undecimpunctata*.

as far as dorsal spot; elytron usually with 5 black spots and a small scutellar spot (Fig. 657f). Male genitalia as in Figure 657a–d. Female genitalia as in Figure 657e.

Discussion. This species is an accidentally introduced Eurasian species first reported from North America by Schaeffer (1912). The most recent surveys of distribution are by Watson (1979) and Wheeler and Hoebeke (1981). It is highly distinctive in our fauna and should not be confused with any other species of *Coccinella*.

Type locality. "Europa."

Type depository. Type not examined.

Distribution. Figure 656. BRITISH COLUMBIA: Vancouver. MIQUELON ISLAND. NEW BRUNSWICK: Fundy National Park. NEWFOUNDLAND: Cow Head; Fogo; Grand Bank; Piccadilly; Port au Port Peninsula; St. Pauls; Tilting; Twillingate. NOVA SCOTIA: Halifax. ONTARIO: Collingwood; Guelph; Harrow; London; Manitoulin Island; Ottawa; Port Stanley; Toronto; Waterloo. PRINCE EDWARD ISLAND: Brackley Beach. QUEBEC: Baie St. Paul; Becancour; Berthierville; Richelieu; St. Augustin; St. Louis; St. Foy; Sorasboro. CONNECTICUT: Rocky Hills St. Pk. MASSACHUSETTS: Arlington; Chelsea; Falmouth Heights; Lynn Beach; Medford; Nahant; Provincetown; Saugus; Stoneham; Wollaston. NEW JERSEY: Camden; Rutherford. NEW YORK: East Marion; Flanders; Ghent; Great Kills; Greenport; Ithaca; Jefferson Co.; Long Island; Ludlowville; Mexico; Newburgh; New York City; Orient; Riverhead; Rossie; Staten Island. OHIO: Bowling Green. ORE-

GON: Benton Co., Corvallis. PENNSYLVANIA: Philadelphia. RHODE ISLAND: Providence Co., Cumberland. WASHINGTON: Seattle.

Coccinella monticola Mulsant

Fig. 658a–g; Map, Fig. 659

- Coccinella monticola* Mulsant, 1850, p. 115.—Mulsant, 1866, p. 96.—Crotch, 1873, p. 371.—Crotch, 1874b, p. 115.—Wickham, 1894, p. 301.—Casey, 1899, p. 89.—Leng, 1903b, p. 198.—Johnson, 1910, p. 63.—Palmer, 1914, p. 222.—Brown, 1962, p. 802.—Belicek, 1976, p. 333.
- Coccinella nivicola monticola*: Dobzhansky, 1931, p. 17.—Dobzhansky, 1933, p. 111.—Wingo, 1952, p. 46.—Hatch, 1961, p. 178.
- Coccinella lacustris* LeConte, 1852, p. 131.
- Coccinella alutacea* Casey, 1899, p. 89.
- Coccinella transversoguttata alutacea*: Leng, 1903b, p. 200.
- Coccinella monticola alutacea*: Johnson, 1910, p. 63.
- Coccinella nivicola alutacea*: Dobzhansky, 1931, p. 19.—Dobzhansky, 1933.— p. 111.—Hatch, 1961, p. 178.
- Coccinella impressa* Casey, 1899, p. 89 (not *Coccinella undecimpunctata impressa* Verhoeff, 1891).
- Coccinella transversoguttata impressa*: Leng, 1903b, p. 199.
- Coccinella monticola impressa*: Casey, 1908, p. 404.
- Coccinella monticola* ab. *impressa*: Johnson, 1910, p. 216.
- Coccinella nevadica* Casey, 1899, p. 88.—Casey, 1908, p. 402.
- Coccinella transversoguttata* var. *nevadica*: Leng, 1903b, p. 201.
- Coccinella transversoguttata nevadica*: Leng, 1920, p. 216.
- Coccinella transversoguttata* ab. *nevadica*: Mader, 1936, p. 374.
- Coccinella californica nevadica*: (?) Dobzhansky, 1931, p. 12.
- Coccinella monticola sellica* Johnson, 1910, p. 63.
- Coccinella monticola postica* Johnson, 1910, p. 63 (not *Coccinella postica* Mulsant, 1850).
- Coccinella monticola confluenta* Johnson, 1910, p. 63 (not *Coccinella novemnotata confluenta* Fitch, 1862).
- Coccinella monticola biguttata* Johnson, 1910, p. 63 (not *Coccinella biguttata* Fabricius, 1787).

Diagnosis. Length 5.20 to 7.0 mm. Head black with 2 pale spots; pronotum with anterior margin black at middle; ventral pale spot large, trapezoidal, extending posteriorly nearly as far as dorsal spot; elytron with scutellar spot, other spots heavy, reduced or lacking depending on locality (Fig. 658f, g). Male genitalia as in Figure 658a–d. Female genitalia as in Figure 658e.

Discussion. *C. monticola* is widespread and variable in color pattern. It is not a commonly collected species but the key characters will enable it to be recognized. The types of the Casey names *alutacea* (female), *impressa* (female), and *nevadica* (male), are all unique (holotypes). The type of *C. monticola* is supposed to be in the LeConte collection, but no specimens presently exist there that could be type material. Three specimens under that name bear a dark blue disc signifying Oregon or Wash-

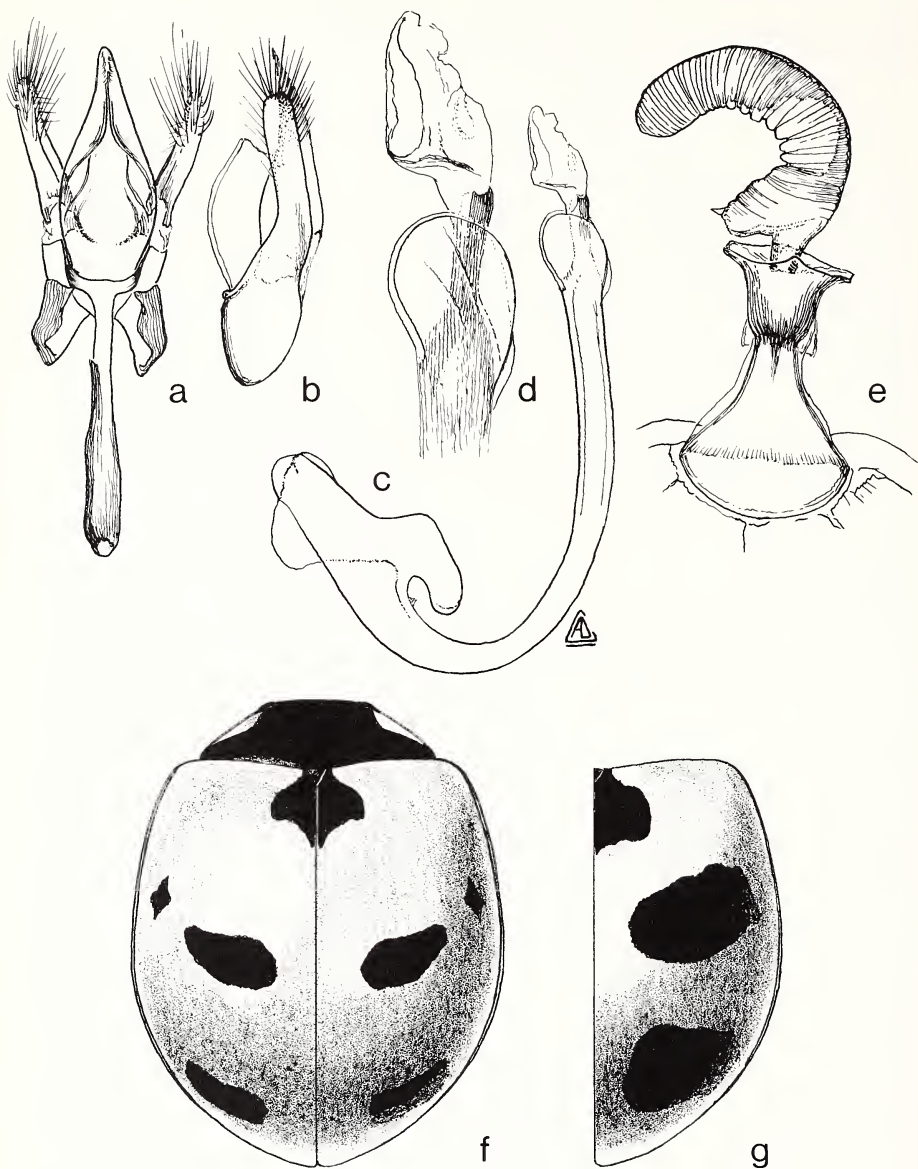


Fig. 658. *Coccinella monticola*.

ington as the locality, but have no other data. Two specimens have pale blue, cut edged labels signifying the north shore of Lake Superior. The third specimen in the series is labeled as a type of *C. lacustris*. I here designate and label as the lectotype



Fig. 659. Distribution. *Coccinella monticola*.

this specimen bearing the labels "(pale blue disc)/4624/TYPE 6688 (red paper)/*C. lacustris* LeC.". I also consider the 2 specimens with pale blue, cut edged labels, type material of *lacustris* and label them as paralectotypes.

Type locality. Of *monticola*, "les Montagnes Rocheuses" (Rocky Mountains); of *lacustris*, Lake Superior (lectotype here designated); of *alutacea*, New Mexico; of *impressa*, California; of *nevadica*, Reno., Nevada; of *sellica*, California, of *postica*, California; of *confluenta*, California; of *biguttata*, Colorado.

Type depository. Of *monticola*, not known; of *lacustris*, MCZ; of *alutacea* (35519), *impressa* (35520), and *nevadica* (35522), USNM; of *sellica*, *postica*, *confluenta*, and *biguttata*, types not designated.

Distribution. Figure 659. Nova Scotia to Massachusetts and New York, west to Northwest Territories and California. Peripheral localities: Baddeck, Nova Scotia; Fredericton, New Brunswick; Sudbury, Ontario; Treesbank, Manitoba; Waskesiu

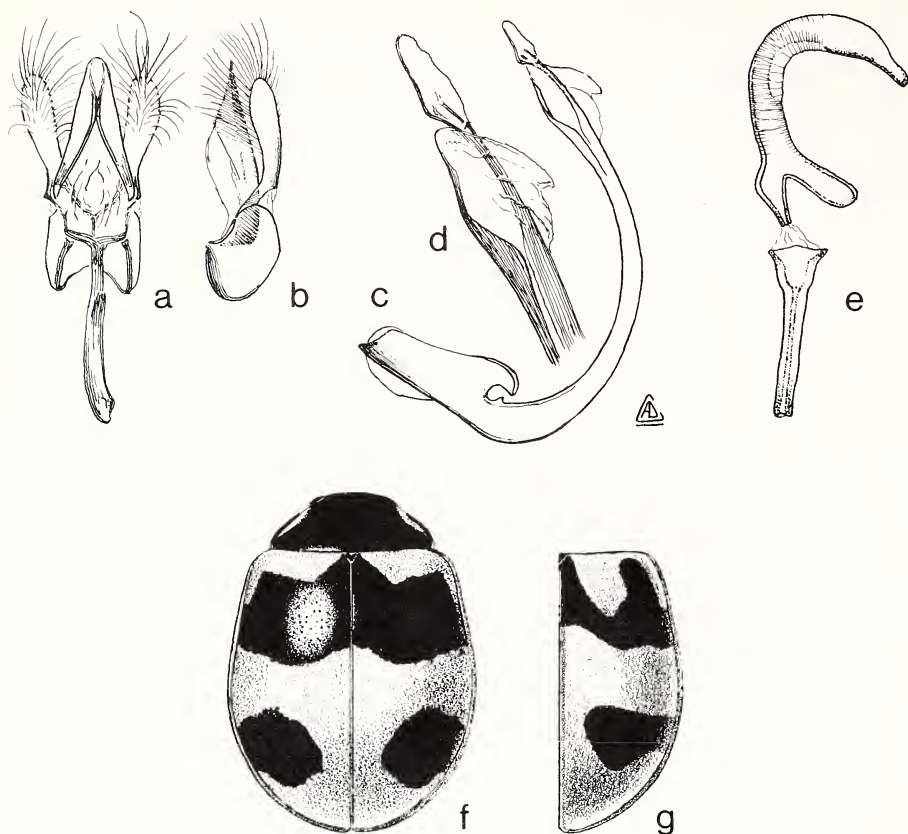


Fig. 660. *Coccinella hieroglyphica kirbyi*; *C. h. mannerheimi*.

Lake, Saskatchewan; Fort Smith and Fort McPherson, Northwest Territories; Springfield, Massachusetts; Duluth, Minnesota; Rincon, New Mexico; Prescott, Arizona; Mono Co., California.

Coccinella hieroglyphica kirbyi Crotch

Fig. 660a-e, g; Map, Fig. 661

Coccinella kirbyi Crotch, 1874, p. 37 (new name for *tricuspis* Kirby, not Thunberg).
Coccinella hieroglyphica kirbyi: Timberlake, 1943, p. 14.—Brown, 1962, p. 804.
Coccinella hieroglyphica L., 1758, p. 365 (in part).—Hatch, 1961, p. 180.—Belicek, 1976, p. 334.

Coccinella tricuspis Kirby, 1837, p. 231 (not *Coccinella tricuspis* Thunberg, 1794).—Mulsant, 1850, p. 107.—Mulsant, 1866, p. 88.—Crotch, 1873, p. 371.—Weise, 1892., p. 25 (in part).—Wickham, 1894, p. 301.—Casey, 1899, p. 90.—Leng, 1903b, p. 201 (in part); Johnson, 1910, p. 59.

Coccinella hieroglyphica tricuspis: Dobzhansky, 1931, p. 26.—Wingo, 1952, p. 46.

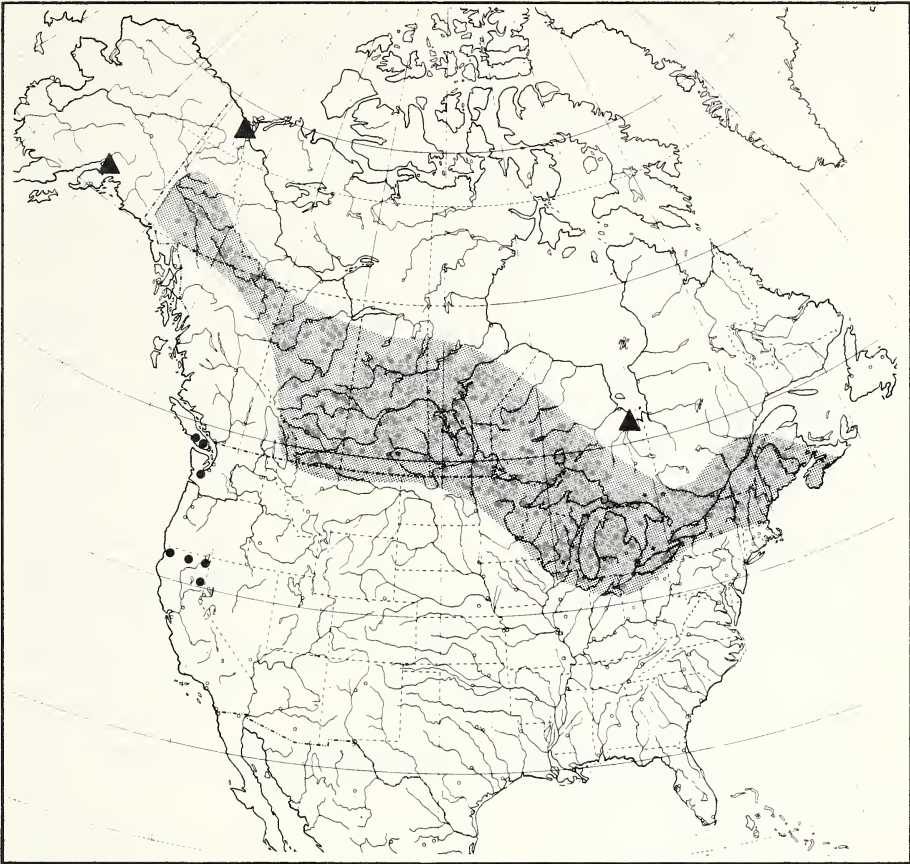


Fig. 661. Distribution. *Coccinella hieroglyphica* Kirbyi (shaded); *C. h. mannerheimi* (tri-angle); *C. h. humboldtiensis* (dot).

Coccinella mannerheimi tricuspis: Mader, 1930, p. 160.
Coccinella mannerheimi: Crotch, 1874b (in part).

Diagnosis. Length 3.70 to 4.70 mm. Head black with 2 well separated pale spots; pronotum with anterior margin narrowly pale at middle in nearly all males and some females, black in most females and some males, ventral pale spot large, trapezoidal, extending posteriorly nearly as far as dorsal spot; elytron with heavy, tricusate subbasal band and large transverse spot at apical $\frac{1}{4}$ (Fig. 660g). Male genitalia as in Figure 660a–g. Female genitalia as in Figure 660e.

Discussion. The nominate subspecies is Eurasian, and Brown (1962) provides a key to separate it from *kirbyi*. One female type specimen of *tricuspis* labeled “Type (white disc with red border)/n. amer. 5962 a./*Coccinella tricuspis* Kirby n. amer. 5962 Rev. W. Kirby” has been examined and is here designated and labeled as the lectotype.

Type locality. North America (lectotype here designated).

Type depository. BMNH.

Distribution. Figure 661. Nova Scotia and New Hampshire to Yukon Territory, south to British Columbia and Montana.

Coccinella hieroglyphica mannerheimi Mulsant

Fig. 660f; Map, Fig. 661

Coccinella mannerheimii Mulsant, 1850, p. 106.—Mulsant, 1866, p. 88.—Crotch, 1874, p. 115 (in part); Mader, 1930, p. 160.

Coccinella tricuspidis mannerheimi: Weise, 1892, p. 26.

Coccinella hieroglyphica mannerheimi: Dobzhansky, 1926, p. 24.—Brown, 1962, p. 805.

Description as for *C. h. kirbyi* except anterior margin of pronotum always black, subbasal band of elytron rarely tricusate (Fig. 660f).

This is a subarctic subspecies reported from North America for the first time by Brown (1962).

Type locality. Siberia.

Type depository. Not known.

Distribution. Figure 661. MANITOBA: Churchill. NORTHWEST TERRITORIES: Aklavik; Reindeer Depot. ALASKA: Matanuska.

Coccinella hieroglyphica humboldtiensis Nunenmacher

Map, Fig. 661

Coccinella humboldtiensis Nunenmacher, 1912, p. 448.

Coccinella hieroglyphica humboldtiensis: Dobzhansky, 1931, p. 37.—Hatch, 1961, p. 180.—Brown, 1962, p. 805.

Diagnosis. Length 4.0 to 4.80 mm. Head black with 2 well separated spots or entirely black; pronotum with anterior margin black at middle; elytron varies from maculation extremely reduced to surface almost entirely black except for obscure reddish streak at middle of lateral margin. Other characters as in *C. h. kirbyi*.

Discussion. This variable species occurs mainly in the Pacific coastal regions from northern and east central California to Vancouver Island. The known specimens of the dark phase are from Vancouver Island. There are 2 type specimens in the CAS, I designate and label a male labeled "C. City, Del Norte Co. Cal. V.17.10/coll'd by F. W. Nunenmacher/male sign/Coccinella humboldtiensis Nun" as the lectotype.

Type locality. Crescent City, Del Norte Co., California (lectotype here designated).

Type depository. CAS.

Distribution. Figure 661. VANCOUVER ISLAND: Courtenay; Duncan. CALIFORNIA: Crescent City; Mammoth; Plumas Co., Siskiyou Co. WASHINGTON: Olympia.

Genus *Propylaea* Mulsant

Propylaea Mulsant, 1846, p. 152.—Mulsant, 1850, p. 212.—Mulsant, 1866, p. 150.—Crotch, 1874b, p. 157.—Korschefsky, 1932, p. 530.—Iablokoff-Khnzorian, 1982, p. 164. Type-species; *Coccinella quatuordecimpunctata* L., by monotypy.

Coccinellini with length 3.0 to 5.50 mm; form oval, slightly depressed. Antero-lateral angle of clypeus produced forward. Pronotum and elytron with lateral margin weakly explanate; epipleuron descending externally. Intercoxal process of prosternum with distinct, narrow, lateral ridge extending nearly to apex of prosternum. Apical margin of mesosternum arcuately notched for reception of prosternal process. Apex of middle and hind tibiae with 2 spurs. Tarsal claw with basal, subquadrate tooth (Fig. 662b). Postcoxal line of *Nephus* type (Fig. 662a). Male genitalia symmetrical. Female genitalia with infundibulum (Fig. 663e).

Propyleae is an Old World genus with one species established in eastern Canada. *Propyleae quatuordecimpunctata* has been intentionally released in the United States several times (New Jersey, Oklahoma) but is not established. The origin of the established population in Canada is unknown and was reported for the first time by Chantal (1972). Members of this genus are primarily aphid predators with specific host records as follows; *Acyrtosiphon dirhodum* (Walker), *Acyrtosiphon pelargonii* (Kaltenbach), *Acyrtosiphon pisum* (Harris), *Acyrtosiphon solani* (Kaltenbach), *Anoecia corni* (F.), *Aphis craccivora* Koch, *Aphis donacis* Passerini, *Aphis fabae* Scopoli, *Aphis gossypii* Glover, *Aphis nerii* Boyer de Fonscolombe, *Aphis pomi* de Geer, *Aphis spiraeophila* Patch, *Brachycaudus helichrysi* (Kaltenbach), *Brachycaudus lychnidis* (L.) *Brachycaudus persicae* (Passerini), *Brevicoryne brassicae* (L.), *Dactynotus cirsii* (L.), *Dactynotus jacea* (L.), *Dactynotus sonchi* (L.), *Drepanosiphum platanoidis* (Schrank), *Dysaphis plantaginea* (Passerini), *Dysaphis reamuri* (Mordvilko), *Eriosoma lanigerum* (Hausmann), *Eucallipterus tiliae* (L.), *Euceraphis punctipennis* (Zetterstedt), *Glyphina betulae* (L.), *Hyadaphis erysimi* (Kaltenbach), *Hyalopterus pruni* (Geoffroy), *Macrosiphum avenae* (F.), *Macrosiphum euphorbiae* (Thomas), *Megoura vicia* Buckton, *Microlophium evansi* (Theobald), *Myzus malisucta* Matsumura, *Myzus persicae* (Sulzer), *Nasonovia lactucae* (L.), *Prociphilus xylostei* (Degeer), *Pterocallis alni* (Degeer). *P. quatuordecimpunctata* has also been recorded as feeding on larvae of *Lema melanopus* (L.) (Chrysomelidae). *Propyleae* has been systematically treated by Iablokoff-Khnzorian (1982).

Propyleae quatuordecimpunctata (L.)

Fig. 662a–f, 663a–e; Map, Fig. 665

Coccinella quatuordecimpunctata L., 1758, p. 366.

Propylea quatuordecimpunctata: Mulsant, 1846, p. 152.—Mulsant, 1866, p. 150.—Crotch, 1874b, p. 157.—Korschefsky, 1932, p. 532.—Sasaji, 1971, p. 264.—Chantal, 1972, p. 243.—Sasaji, 1975, p. 13.—Iablokoff-Khnzorian, 1982, p. 167.

Diagnosis. Length 3.50 to 5.20 mm, width 2.80 to 4.0 mm. Male head yellow except vertex black, female head with black spot on clypeus; pronotum with large, irregular, black area medially; elytron yellow with variable black maculation (Fig. 663a–d). Male genitalia as in Figure 662c–f. Female genitalia as in Figure 663e.

Discussion. The dorsal color pattern of this species is unlike that of any native North American species of Coccinellini, and the combination of color pattern and the key generic characters make it easy to recognize.

Type locality. "Suecica".

Type depository. Type not examined.

Distribution. Figure 665. QUEBEC: Ste-Foy.

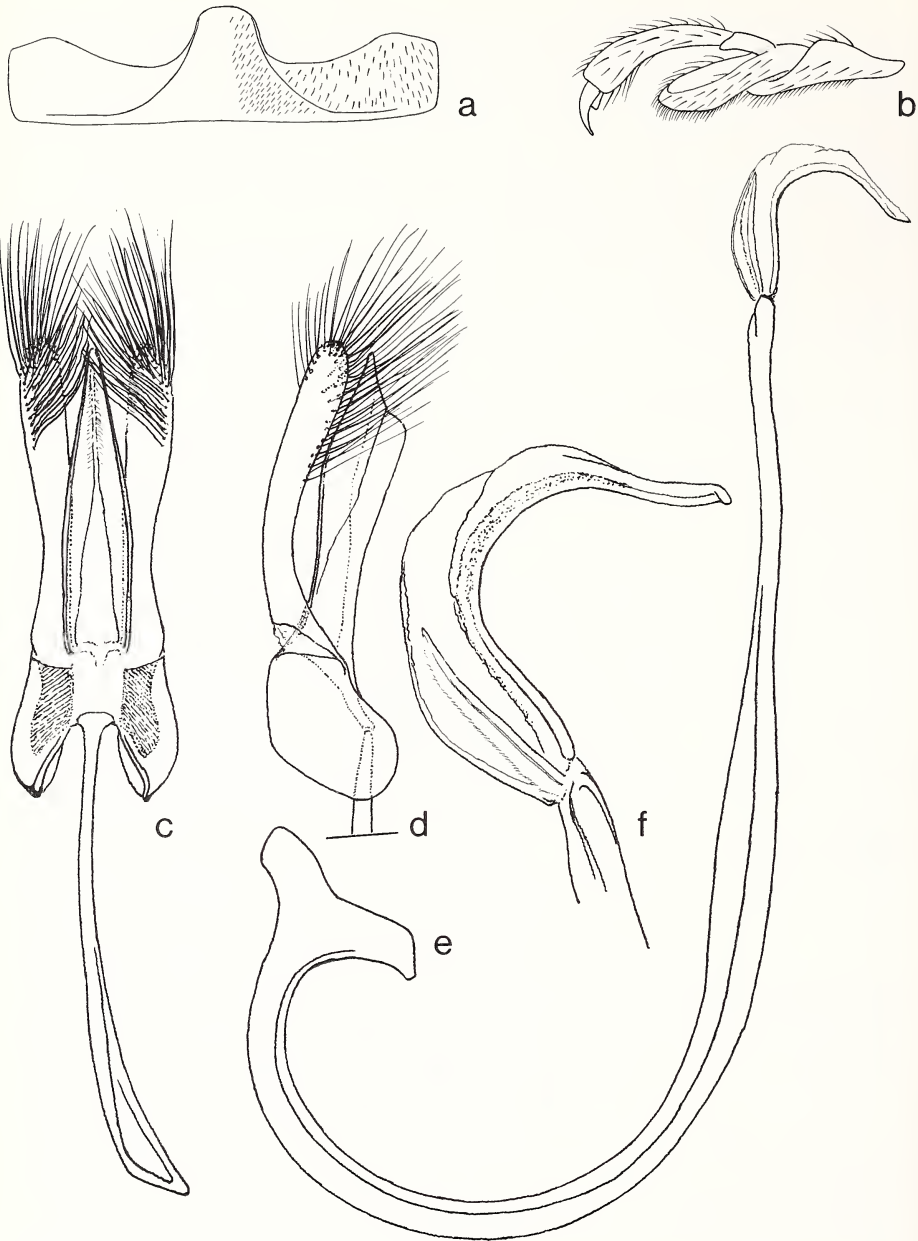


Fig. 662. *Propyleae quatuordecimpunctata*. a. Postcoxal lines. b. Tarsus. c-f. Male genitalia.

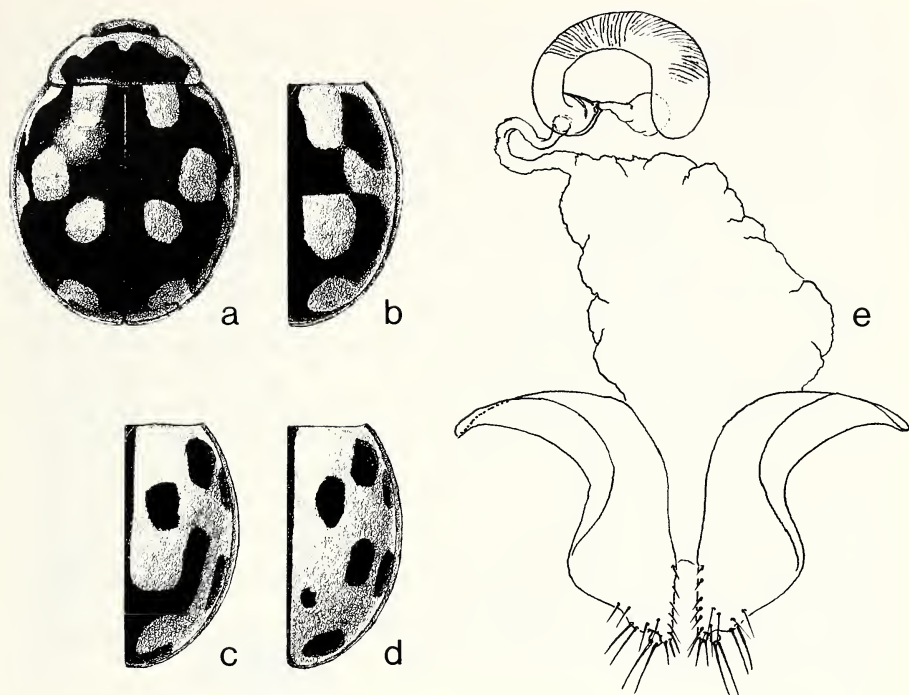


Fig. 663. *Propyleae quatuordecimpunctata* (habitus and variation, female genitalia).

Genus *Cycloneda* Crotch

Cycloneda Crotch, 1871, p. 6.—Crotch, 1873, p. 371.—Crotch, 1874b, p. 162.—Gorham, 1891, p. 58.—Casey, 1899, p. 84.—Leng, 1920, p. 216.—Korschevsky, 1932, p. 282.—Timberlake, 1943, p. 23.—Wingo, 1952, p. 24.—Mader, 1958, p. 238.—Hatch, 1961, p. 181.—J. Chapin, 1974, p. 62.—Belicek, 1976, p. 330. Type-species; *Coccinella sanguinea* L., by subsequent designation of Crotch, 1874b. *Daulis* Mulsant, 1850, p. 296 (not *Daulis* Erichson, 1842).—Crotch, 1874b, p. 162.—Berg, 1874, p. 290.—Chapuis, 1876, p. 201. Type-species; not designated. *Coccinella* (*Cycloneda*), Leng, 1903b, p. 202.

Coccinellini with length 3.0 to 9.0 mm; form rounded, convex (Fig. 664h). Elytron pale, immaculate; pronotum black with pale markings (North American species). Apex of clypeus truncate, anterolateral angle produced forward. Lateral margin of elytron feebly explanate; epipleuron obliquely descending externally. Intercoxal process of prosternum narrow, ridged medially, lateral ridges obsolete. Apical margin of mesosternum truncate or barely perceptibly emarginate. Apex of middle and hind tibia each with 2 spurs. Tarsal claw with large, subquadrate basal tooth (Fig. 664b). Postcoxal line incomplete, of *Diomus* type, without oblique dividing line (Fig. 664a). Male genitalia symmetrical. Female genitalia with infundibulum; coxal plate irregularly elongate with distinct apical stylus (Fig. 668e).

Cycloneda is very similar to *Olla* (see comments under *Olla*) but at least in the limited North American fauna the two genera can be readily separated by the key characters. In addition, *C. sanguinea* and allies have a strong infundibulum in the female genitalia; *O. v-nigrum* lacks an infundibulum. *Cycloneda* is a New World genus with more than 50 names presently included. Most of these are neotropical with 3 species occurring north of Mexico. Casey (1899) described *C. ater* from an unlabeled specimen. This species is not a member of the North American fauna and is most likely a neotropical member of the genus. Timberlake (1943) expressed the opinion that the genus *Cycloneda* should be restricted to *C. sanguinea* and allied species having immaculate elytra. Mader (1958) published a key to the species of *Cycloneda* but did not examine genitalia. He did not alter the generic classification appreciably and a complete study of this group is still needed. Members of *Cycloneda* are primarily aphid predators with specific host records as follows: *Acyrtosiphon dirhodum* (Walker), *Acyrtosiphon pisum* (Harris), *Aphis gossypii* Glover, *Aphis nerii* Boyer de Fonscolombe, *Aphis pomi* Degeer, *Aphis viburni* Scopoli, *Brevicoryne brassicae* (L.), *Carolinaia cyperi* Ainslie, *Chapitophorus eleagni* (del Guercio), *Eriosoma lanigerum* (Hausmann), *Hyadaphis erysimi* (Kaltenbach), *Macrosiphum avenae* (F.), *Macrosiphum euphorbiae* (Thomas), *Myzus cerasi* (F.), *Myzus persicae* (Sulzer), *Nearctaphis crataegifoliae* (Fitch), *Periphyllus negundinis* (Thomas), *Phorodon humuli* (Schränk), *Rhopalosiphum maidis* (Fitch), *Sipha flava* (Forbes), *Sipha maydis* Passerini, *Toxoptera aurantii* (Boyer de Fonscolombe). The genus has not been taxonomically studied as a whole since Crotch (1874b), except for Mader's (1958) key to species.

KEY TO SPECIES OF *Cycloneda*

1. Pronotum with pale lateral spot enclosed by black coloration (Fig. 664h) 3
- Pronotum with pale lateral spot not entirely enclosed, or with isolated lateral black spot (Fig. 667f) 2
- 2(1). Elytron usually red; California and the Pacific Northwest *polita* Casey
- Elytron orange; eastern United States *munda* (Say)
- 3(1). Lateral border of elytron black *sanguinea limbifer* Casey
- Lateral border of elytron pale *sanguinea sanguinea* (L.)

Cycloneda sanguinea sanguinea (L.)

Fig. 664a–h; Map, Fig. 665

Coccinella sanguinea L., 1763, p. 10.

Daulis sanguinea: Mulsant, 1850, p. 326.

Cycloneda sanguinea: Crotch, 1871, p. 6.—Crotch, 1873, p. 372.—Crotch, 1874b, p. 164.—Blatchley, 1910, p. 515.—Palmer, 1914, p. 232.—Korschefsky, 1932, p. 286.—Timberlake, 1943, p. 23.—Wingo, 1952, p. 46.—Mader, 1958, p. 241.—J. Chapin, 1974, p. 62.

Coccinella immaculata F., 1792, p. 267.

Daulis immaculata: Mulsant, 1850, p. 327.

Cycloneda immaculata: Casey, 1899, p. 92.

Cycloneda rubripennis Casey, 1899, p. 92.—Korschefsky, 1932, p. 285 (as synonym of *munda*).—Mader, 1958, p. 241.

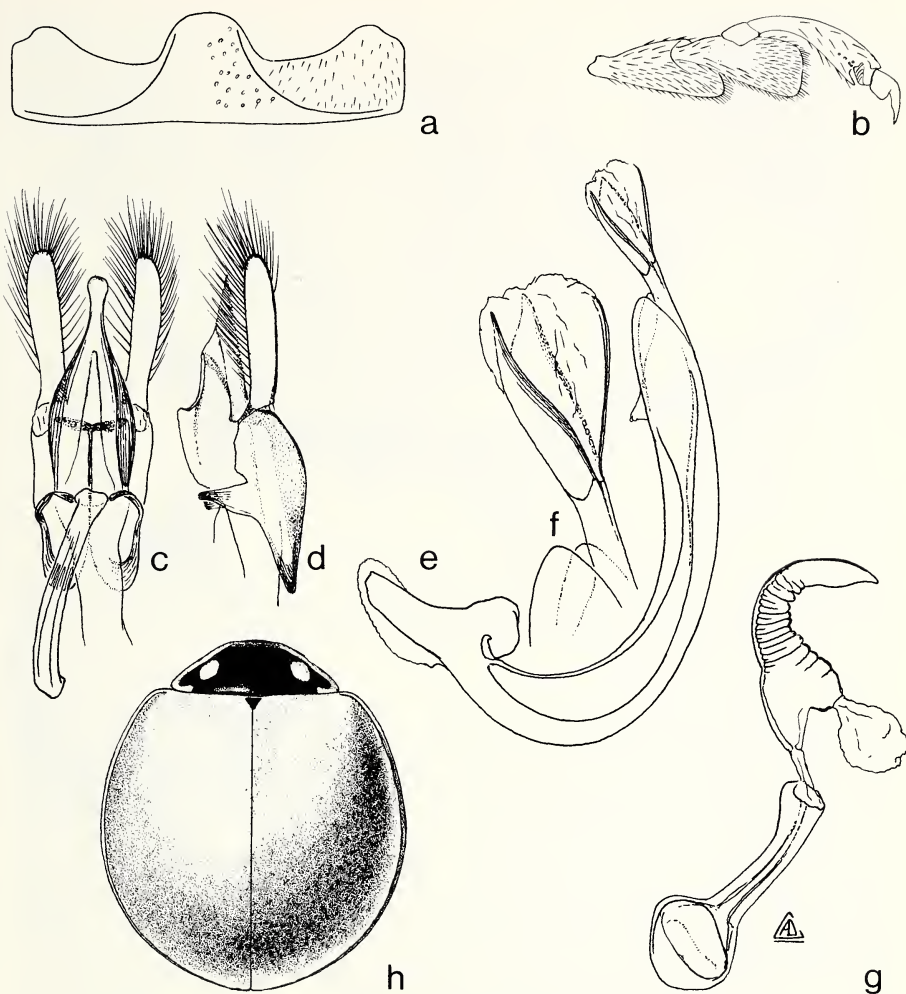


Fig. 664. *Cycloneda sanguinea sanguinea*. a. Postcoxal lines. b. Tarsus. c–f. Male genitalia. g. Female genitalia. h. Habitus.

Coccinella (Cycloneda) sanguinea: Leng, 1903b, p. 202.

Coccinella (Cycloneda) sanguinea var. *immaculata*: Leng, 1903b, p. 203.

Coccinella (Cycloneda) sanguinea var. *rubripennis*: Leng, 1903b, p. 203.

Diagnosis. Length 3.20 to 6.50 mm, width 2.90 to 5.10 mm. Pronotum mostly black with lateral pale spot enclosed by black area; elytron orange to red (Fig. 664h). Male genitalia as in Figure 664c–f. Female genitalia as in Figure 664g.

Discussion. The pronotal color pattern will distinguish *C. sanguinea* from the other North American species in almost all instances. The male and female genitalia are

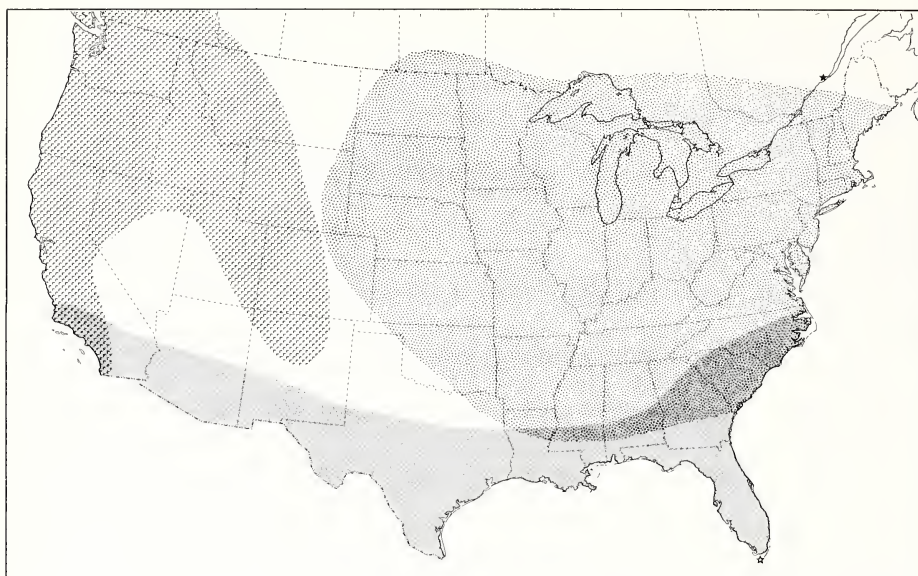


Fig. 665. Distribution. *Cycloneda sanguinea sanguinea* (shaded, southern); *C. s. limbifer* (star); *C. munda* (shaded, northern); *C. polita* (shaded, western).

distinctive for all species and should be checked where external characters are doubtful. This species is found from the southern United States to Argentina and varies greatly in size and coloration. The synonymy above deals only with the geographic area north of Mexico and Korschefsky (1932) is to be consulted for the synonymy of *C. sanguinea* in the neotropical region. *Cycloneda rubripennis* Casey was considered a synonym of *C. munda* (Say) by Korschefsky, and I agree that it is a junior synonym, but of *C. sanguinea*. There are 7 types of *C. rubripennis* in the Casey collection and I designate and label the first of these as the lectotype, the remainder as paralectotypes.

Type locality. Of *sanguinea*, Surinam; of *immaculata*, "Americae Insulis" (American Islands); of *rubripennis*, San Diego, California (lectotype here designated).

Type depository. Of *sanguinea* and *immaculata*, not known; of *rubripennis*, USNM (35525).

Distribution. Figure 665. North Carolina to Florida, west to southern California.

Cycloneda sanguinea limbifer Casey
Fig. 660a-f; Map, Fig. 665

Cycloneda limbifer Casey, 1899, p. 92.

Coccinella (Cycloneda) limbifer: Leng, 1903b, p. 204.

Cycloneda sanguinea ab. *limbifera*: Korschefsky, 1932, p. 286.—Mader, 1958, p. 241.

Cycloneda sanguinea limbifer: Chapin, 1949, p. 23.—Chapin, 1957, p. 89.

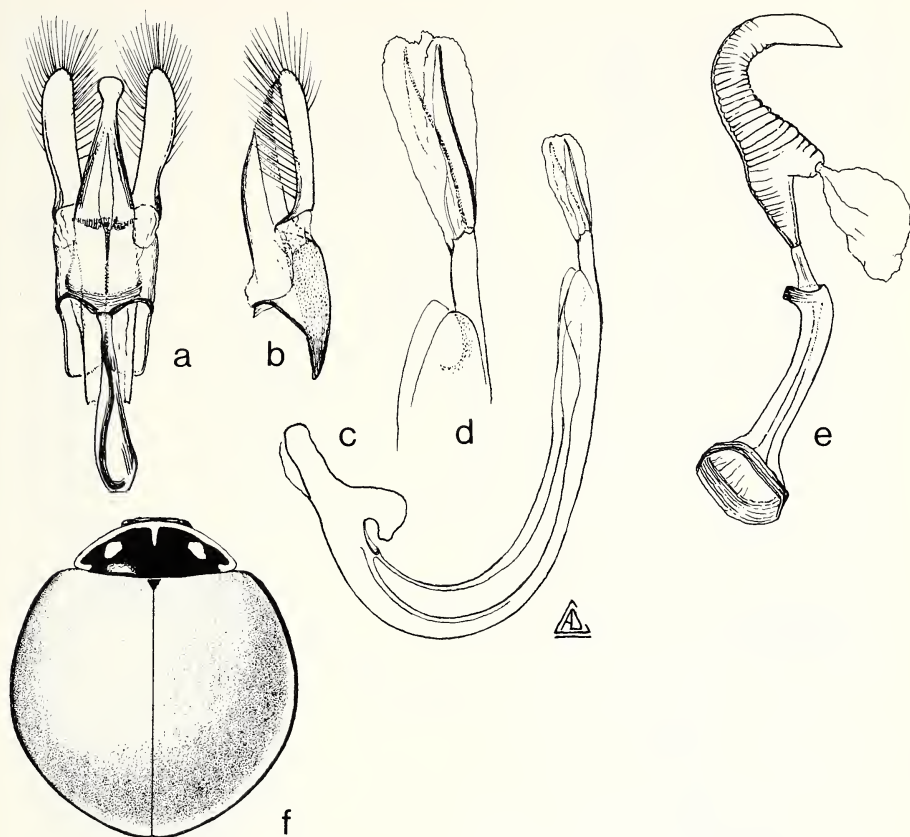


Fig. 666. *Cycloneda sanguinea limbifer*.

Description as for *C. s. sanguinea* except lateral border of elytron black (Fig. 666f). Male genitalia as in Figure 666a–d. Female genitalia as in Figure 666e.

This is a West Indian subspecies recorded from Key West, Florida, by Chapin (1949). Only 2 specimens were collected and it may not be established on the mainland. There are 4 types of *C. limbifer* in the Casey collection, the first of which is designated and labeled as the lectotype and the remainder as paralectotypes.

Type locality. Egg Island, Bahama Islands (lectotype here designated).

Type depository. USNM (35526).

Distribution. Figure 665. FLORIDA: Key West.

Cycloneda munda (Say)
Fig. 667a–f; Map, Fig. 665

Coccinella munda Say, 1835, p. 202.—Crotch, 1874b, p. 107.
Daulis munda: Mulsant, 1850, p. 324.

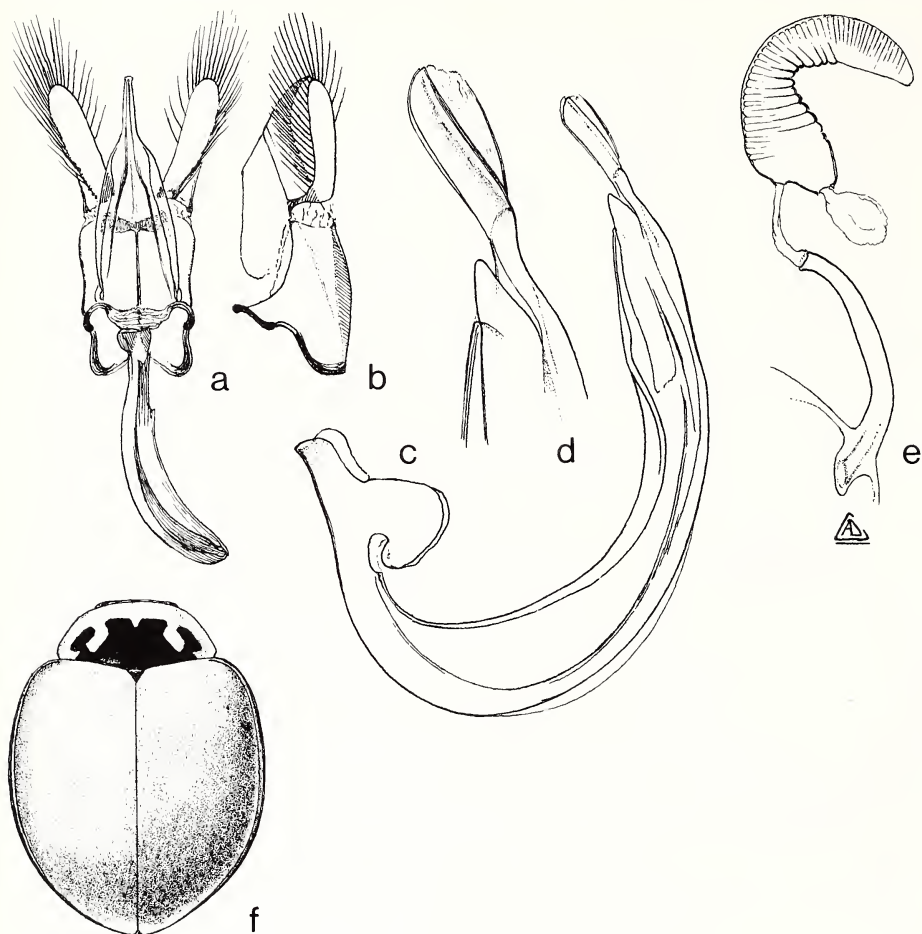


Fig. 667. *Cycloneda munda*.

Cycloneda munda: Crotch, 1871, p. 6.—Casey, 1899, p. 93.—Leng, 1920, p. 216.—Korschevsky, 1932, p. 284.—Timberlake, 1943, p. 23.—Wingo, 1952, p. 46.—J. Chapin, 1974, p. 63.

Coccinella (Cycloneda) sanguinea var. *munda*: Leng, 1903b, p. 203.

Diagnosis. Length 3.70 to 5.70 mm, width 3.10 to 4.20 mm. Pronotum mostly black with lateral pale spot not completely enclosed by black area, or with separate black spot laterally (Fig. 667f); elytron reddish yellow. Male genitalia as in Figure 667a–d. Female genitalia as in Figure 667e.

Discussion. This species is widespread in the eastern United States and overlaps the distribution of *C. sanguinea* (see comments under *sanguinea*).

Type locality. Type material was from various localities in North America.

Type depository. Type lost.

Distribution. Figure 665.

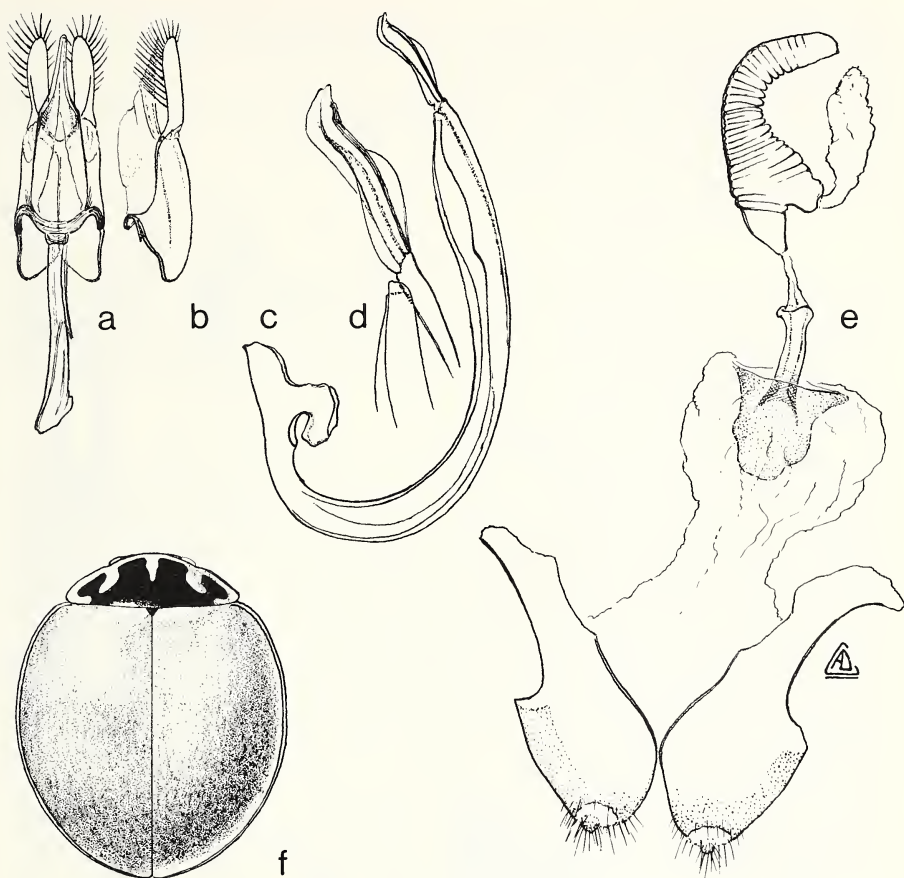


Fig. 668. *Cycloneda polita*.

Cycloneda polita Casey
Fig. 668a-f, Map, Fig. 665

Cycloneda polita Casey, 1899, p. 93.—Timberlake, 1943, p. 24.—Hatch, 1961, p. 181.—Belicek, 1976, p. 330.

Coccinella (*Cycloneda*) *sanguinea* var. *polita*: Leng, 1903b, p. 203.

Cycloneda munda ab. *polita*: Leng, 1920, p. 216.—Korschevsky, 1932, p. 285.

Cycloneda polita flava Timberlake, 1943, p. 24. **New Synonymy.**

Diagnosis. Length 3.50 to 6.20 mm, width 3.0 to 4.0 mm. Color as for *munda* except elytron usually red (Fig. 668f). Male genitalia as in Figure 668a-d. Female genitalia as in Figure 668e.

Discussion. This species will be confused with *C. munda* but the two species are allopatric and both the male and female genitalia are distinctive for each species. There are 8 type specimens of *C. polita* in the Casey collection, the first of which is designated and labeled as the lectotype and the remainder as paralectotypes. The

only difference between *C. polita* and *C. p. flava* is the yellow elytral color of the latter. The genitalia are the same. Therefore I do not recognize it as a valid subspecies and place it as a junior synonym of *polita*.

Type locality. Of *polita*, Marin Co., peninsula north of San Francisco, California (lectotype here designated); of *flava*, Alameda, California.

Type depository. Of *polita*, USNM (35527); of *flava*, HSPA.

Distribution. Figure 655.

Genus *Olla* Casey

Olla Casey, 1899, p. 93.—Leng, 1920, p. 216.—Korschefsky, 1932, p. 288.—Timberlake, 1943, p. 55.—Wingo, 1952, p. 24.—J. Chapin, 1974, p. 64.—Belicek, 1976, p. 329. Type-species; *Coccinella abdominalis* Say, by subsequent designation of Korschefsky, 1932.

Coccinella (Olla): Leng, 1903b, p. 197.

Coccinellini with length 3.0 to 9.0 mm; form rounded, convex (Fig. 669). Color pattern polymorphic in the North American species. Dorsal surface mostly polished between punctures, fine alutaceous sculpture present. Apex of clypeus truncate, anterolateral angle produced forward. Lateral margin of elytron feebly explanate; epipleuron strongly, abruptly descending externally. Intercoxal process of prosternum narrow, medially flattened, with broad lateral ridges parallel or slightly convergent anteriorly. Apical margin of mesosternum broadly, feebly emarginate for reception of prosternal process. Apex of middle and hind tibia each with 2 spurs. Tarsal claw with large, subquadrate basal tooth (Fig. 669b). Postcoxal line incomplete, with oblique dividing line (Fig. 669a). Male genitalia symmetrical. Female genitalia lacking infundibulum; coxal plate irregularly elongate with distinct apical stylus (Fig. 670).

Olla may not be distinct from *Cycloneda*, but a comprehensive study of all the included species of both genera is needed to decide this. In any event, the two genera as represented in North America are readily separated on the basis of color pattern. *Olla* is a New World genus with approximately 6 species names, mainly in the Neotropical region. Members of *Olla* are aphid predators with specific host records as follows: *Aphis pomi* Degeer, *Chromaphis juglandica* (Kaltenbach), *Monellia caryella* (Fitch), *Monelliopsis californica*, (Essig), *Monelliopsis caryae* (Monell), *Phorodon humuli* (Schrank). *Olla* has not been taxonomically treated as a whole, but was discussed in part by Timberlake (1943).

Olla v-nigrum (Mulsant)

Fig. 669a-i; Map, Fig. 671

Harmonia v-nigrum Mulsant, 1866, p. 64.

Coccinella abdominalis Say, 1824, p. 95 (not *Coccinella abdominalis* Thunberg, 1794).

Cycloneda sayi Crotch, 1871, p. 6 (new name for *abdominalis* Say).

Cycloneda oculata var. *abdominalis*: Crotch, 1873, p. 372.

Cycloneda abdominalis: Crotch, 1874b, p. 163.—Gorham, 1892, p. 172.

Olla abdominalis: Casey, 1899, p. 93.—Blatchley, 1910, p. 514.—Palmer, 1914, p.

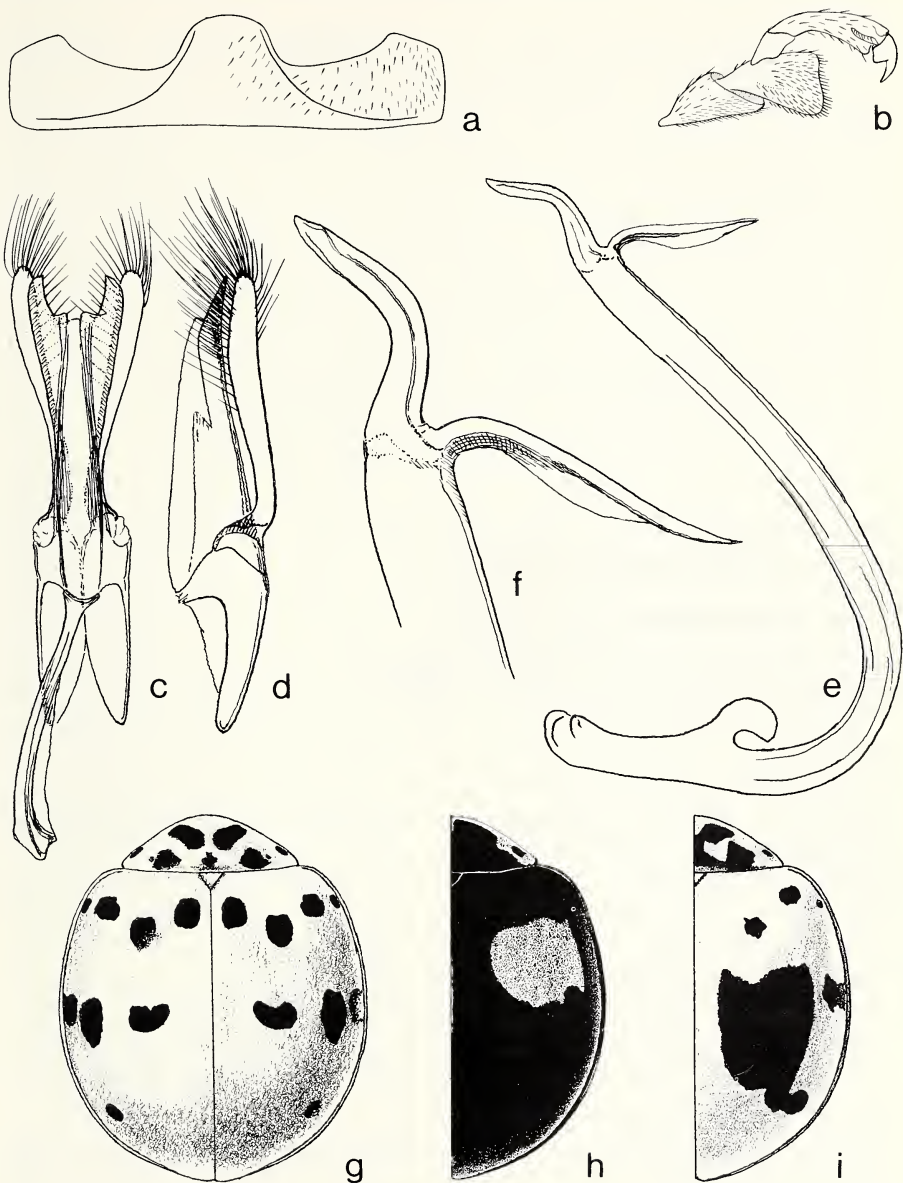


Fig. 669. *Olla v-nigrum*. a. Postcoxal lines. b. Tarsus. c-f. Male genitalia. g-i. Habitus and variations.

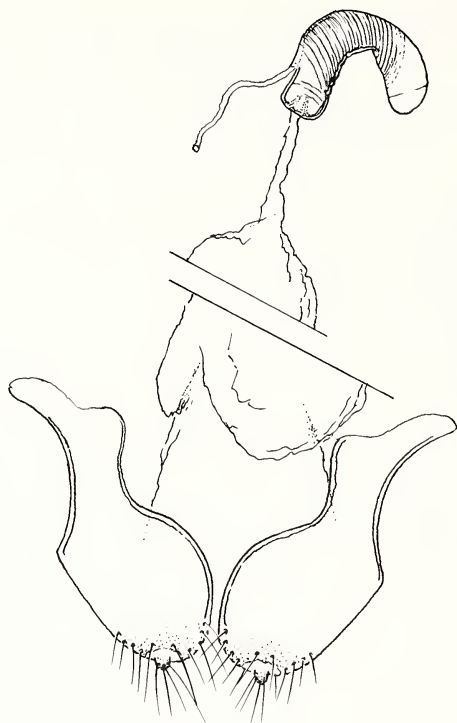


Fig. 670. *Olla v-nigrum* (female genitalia).

- 232.—Leng, 1920, p. 216.—Korschefsky, 1932, p. 288.—Wingo, 1952, p. 46.—J. Chapin, 1974, p. 64.
- Olla plagiata* Casey, 1899, p. 94.—Belicek, 1976, p. 329.
- Olla sobrina* Casey, 1899, p. 94.—Blatchley, 1918, p. 419.—Belicek, 1976, p. 329.
- Olla fenestralis* Casey, 1899, p. 95.—Belicek, 1976, p. 329.
- Coccinella (Olla) oculata* var. *plagiata*: Leng, 1903b, p. 204.
- Coccinella (Olla) oculata* var. *sobrina*: Leng, 1903b, p. 204.
- Coccinella (Olla) oculata* var. *fenestralis*: Leng, 1903b, p. 204.
- Coccinella (Olla) abdominalis*: Leng, 1903b, p. 205.
- Olla minuta* Casey, 1908, p. 406.—Casey, 1924, p. 157.—Belicek, 1976, p. 329.
- Olla semilunaris* Johnson, 1910, p. 66.
- Olla abdominalis arizonae* Casey, 1924, p. 158.—Korschefsky, 1932, p. 289.—Belicek, 1976, p. 329.
- Olla abdominalis* ab. *minuta*: Korschefsky, 1932, p. 289.
- Olla abdominalis* ab. *plagiata*: Korschefsky, 1932, p. 289.
- Olla abdominalis* ab. *sobrina*: Korschefsky, 1932, p. 289.
- Olla abdominalis* ab. *v-nigrum*: Korschefsky, 1932, p. 289.
- Olla v-nigrum*: Timberlake, 1943, p. 24.—Belicek, 1976, p. 329.
- Olla v-nigrum* var. *plagiata*: Timberlake, 1943, p. 24.

Diagnosis. Length 3.70 to 6.10 mm, width 3.0 to 5.0 mm. Dorsal color pattern with background black, maculae pale, or pale yellow with black maculae (Fig. 669g–i). Male genitalia as in Figure 669c–f. Female genitalia as in Figure 670.

Discussion. This species has two basic color variants that are strikingly different and I have seen little evidence of intergradation between the variants. The dark form occurs mostly in the United States. The pale form is very widespread occurring from southern Canada to Central America and on the islands of Guam, Hawaii, and Midway, where it has been introduced for biocontrol purposes. Several names have been proposed for this species, most of which were recently synonymized by Belicek (1976). The name *oculata* F. has been used for the dark form of *v-nigrum* by many authors and is included in the Korschefsky catalog (1932). However, the description of *oculata* is that of a species which does not occur in North America; therefore the name must be removed from North American literature. The Casey names *O. minuta* and *O. fenestralis* are based on single specimens which must be considered holotypes. The other Casey names are based on more than one specimen as follows: *O. a. arizonae* 2, *O. plagiata* 10; and *sobrina*, 3. In each instance the first specimen is designated and labeled as the lectotype and the remainder as paralectotype(s). One type specimen (female) of *v-nigrum* labeled “Oaxaca/Type/2213(green paper)/Mexico, Salle Coll./B.C.A. Col., VII, Cycloneda abdominalis Say/Harmonia v-nigrum Muls Salle. Type” has been located and here designated and labeled as the lectotype.

Type locality. Of *v-nigrum*, Oaxaca, Mexico (lectotype here designated); of *abdominalis*, “Arkansa”; of *plagiata*, Brownsville, Texas (lectotype here designated); of *sobrina*, Florida (lectotype here designated); of *fenestralis*, Las Vegas, New Mexico; of *minuta*, Brownsville, Texas; of *semilunaris*, Arizona and Texas; of *arizonae*, Tucson, Arizona (lectotype here designated).

Type depository. Of *v-nigrum*, BMNH; of *abdominalis*, type lost; of *plagiata* (35529), *sobrina* (35530), of *fenestralis* (35531), *minuta* (35532), and *arizonae* (35533), USNM; of *semilunaris*, no types designated.

Distribution. Figure 671. Southeastern Canada to Florida, west to southern British Columbia and southern California.

Genus *Coelophora*

Coelophora Mulsant, 1850, p. 390.—Mulsant, 1866, p. 257.—Crotch, 1874b, p. 148.—Korschefsky, 1932, p. 290.—Timberlake, 1943, p. 31.—Chapin, 1965b, p. 214.—Iablokoff-Khnzorian, 1982, p. 265. Type species; *Coccinella inaequalis* F., by subsequent designation of Crotch, 1874b.

Coccinellini with length 3.70 to 9.0 mm; form rounded, convex. Elytron yellow with black markings; pronotum yellow with base black (North American species). Apex of clypeus truncate, anterolateral angle produced forward. Lateral margin of elytron feebly explanate; epipleuron abruptly, strongly descending externally. Intercoxal process of prosternum broad, with strong lateral ridges. Apical margin of mesosternum truncate. Apex of middle and hind tibia each with 2 spurs. Tarsal claw with large, subquadrate basal tooth (Fig. 672b). Postcoxal line incomplete, of *Nephus* type (Fig. 672a). Male genitalia symmetrical. Female genitalia without infundibulum; coxal plate with lateral projection and apical stylus (Fig. 672f).

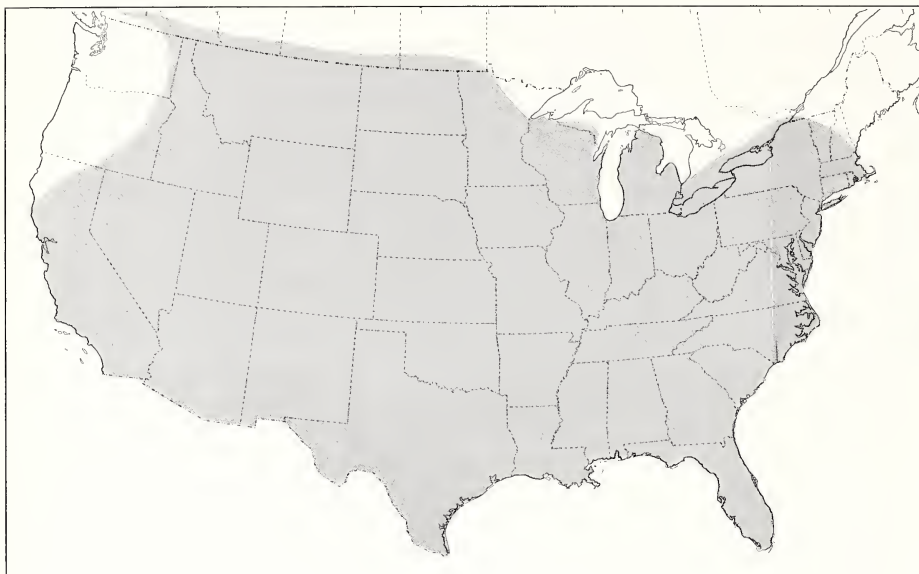


Fig. 671. Distribution. *Olla v-nigrum*.

Coelophora is similar in appearance to *Cycloneda* and *Olla*, but the dorsal color pattern of the only North American representative of this genus is very different from that of either *Olla* or *Cycloneda*. *Coelophora* is an Australian and Oriental genus, one member of which, *C. inaequalis*, is possibly established in Florida. This was apparently not the result of an intentional introduction, and the source of the stock is not known. Members of *Coelophora* are mostly aphid predators, but specific host records are scarce. It is known to prey on the following hosts; *Aphis craccivora* Koch, *Aphis gossypii* Glover, *Aphis nerii* Boyer de Fonscolombe, *Hyadaphis erysimi* (Kaltenbach), *Melanaphis sacchari* (Zehntner), *Myzus persicae* (Sulzer), *Neophyllaphis araucariae* Takahashi, *Rhopalosiphum maidis* (Fitch), *Sipha flava* (Forbes), *Thoracaphis fici* (Takahashi), *Toxoptera aurantii* (Boyer de Fonscolombe), and *Toxoptera citricidus* (Kirkaldy). Chazeau (1981) reported *Coelophora quadrivitta* Fauvel as a predator on the coccid *Coccus viridis* Green in New Caledonia. The genus was treated briefly by Iablokoff-Khnzorian (1981).

Coelophora inaequalis (F.)

Fig. 672a–g; Map, Fig. 673

Coccinella inaequalis F., 1775, p. 80.

Coelophora inaequalis Mulsant, 1850, p. 404.—Mulsant, 1866, p. 266.—Crotch, 1874b, p. 153.—Korschefsky, 1932, p. 292.—Timberlake, 1943, p. 31.—Chapin, 1965b, p. 215.—Leeper, 1976, p. 288.—Iablokoff-Khnzorian, 1982, p. 266.

Diagnosis. Length 3.70 to 5.20 mm, width 3.50 to 4.30 mm. Pronotum yellow, base with irregular black area, elytron yellow with 4 or 5 black maculae (Fig. 672g),

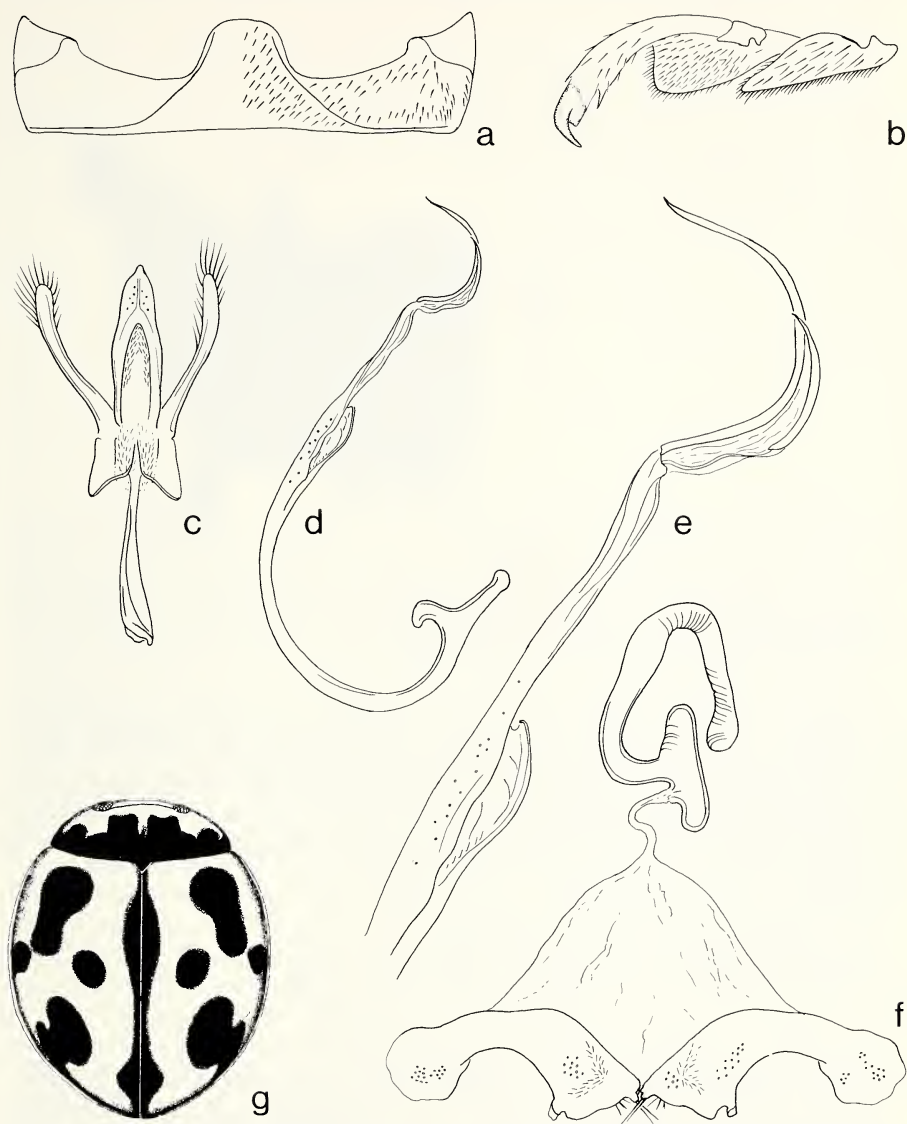


Fig. 672. *Coelophora inaequalis*. a. Postcoxal lines. b. Tarsus. c-e. Male genitalia. f. Female genitalia. g. Habitus.

pattern variable. Male genitalia as in Figure 672c-e. Female genitalia as in Figure 672f.

Discussion. The Florida specimens of *C. inaequalis* correspond to the Philippine specimens described by Timberlake (1943) as *C. inaequalis comperei*. I prefer not to use subspecific definitions in this group at present because much more extensive

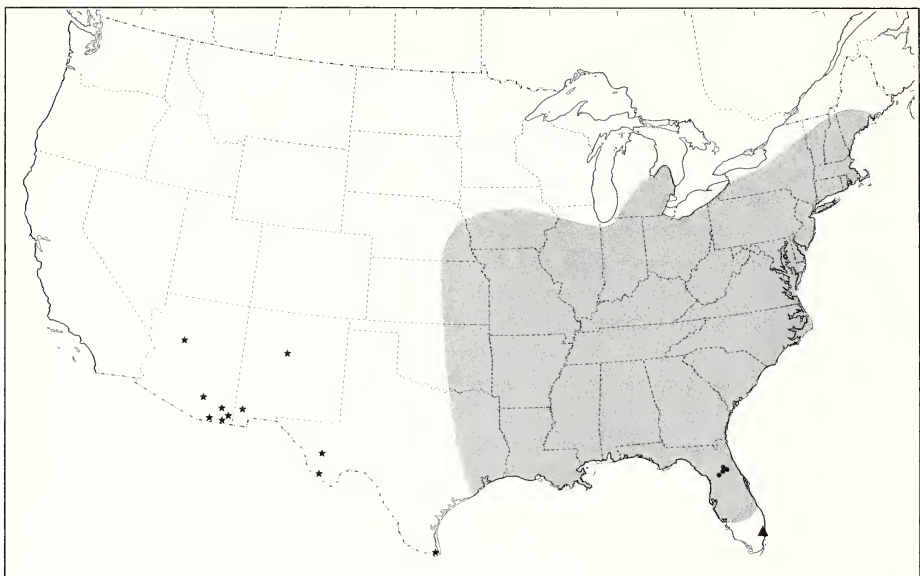


Fig. 673. Distribution. *Coelophora inaequalis* (triangle); *Harmonia dimidiata* (dot); *Neoharmonia venusta venusta* (shaded); *N. v. ampla* (star).

taxonomic research is necessary to accurately define specific and subspecific limits. The synonymy given here is limited and Iablokoff-Khnzorian (1982) is to be consulted for the complete history. The first North American records of this species are specimens collected at Clewiston, Florida, 1939. In 1978, 1979, and 1982 specimens were again collected in Florida, but whether it is firmly established or not is open to question.

Type locality. "nova Hollandia".

Type depository. BMNH (not examined).

Distribution. Figure 673. FLORIDA: Broward Co., Fort Lauderdale; Plantation.

Genus *Harmonia* Mulsant

Harmonia Mulsant, 1850, p. 75.—Mulsant, 1866, p. 55.—Crotch, 1873, p. 373.—Crotch, 1874b, p. 105.—Mader, 1926, p. 19.—Timberlake, 1943, p. 17.—Iablokoff-Khnzorian, 1982, p. 456. Type-species, *Coccinella marginepunctata* Schaller, by subsequent designation of Timberlake, 1943.

Coccinella (*Harmonia*): Korschefsky, 1932, p. 439.

Leis Mulsant, 1850, p. 241.—Mulsant, 1866, p. 174.—Crotch, 1874b, p. 119.—Chapuis, 1876, p. 200.—Sicard, 1909, p. 68.—Korschefsky, 1932, p. 273. Iablokoff-Khnzorian, 1982, p. 456. Type-species; *Coccinella dimidiata* F., by subsequent designation of Crotch, 1874.

Coccinellini with length 4.60 to 11.0 mm; form rounded, convex. Color variable

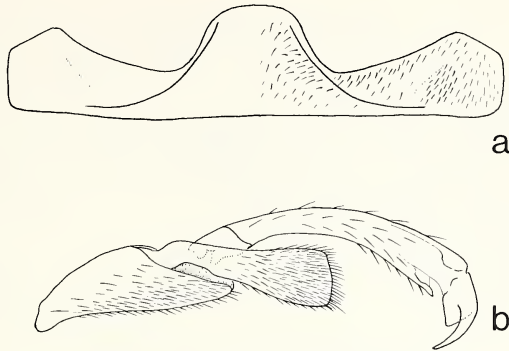


Fig. 674. *Harmonia dimidiata*. a. Postcoxal lines. b. Tarsus.

but dorsum pale with dark maculae. Apex of clypeus truncate, anterolateral angle produced forward. Lateral margin of elytron weakly to strongly explanate; epipleuron abruptly descending externally. Intercoxal process of prosternum broad, flat, with fine carina on each side. Apical margin of mesosternum weakly emarginate medially. Apex of middle and hind tibia each without spurs. Tarsal claw with large, subquadrate basal tooth (Fig. 674b). Postcoxal line incomplete, of *Nephus* type, with irregular, oblique dividing line (Fig. 674a). Male genitalia symmetrical. Female genitalia with infundibulum; coxal plate irregularly elongate with distinct apical stylus (Fig. 676b).

Harmonia is an Oriental and Australian genus of approximately 17 species, one of which, *Harmonia dimidiata* (F.) (*quindecimspilota* Hope), was introduced in 1924 into California (not established) and then from California into Florida where it is established, for biological control of aphids. The large size and dorsal maculation of this representative of the genus easily distinguishes it from all other North American Coccinellini. *Harmonia axyridis* (Pallas) has been released in Delaware, Georgia, and Washington, but is apparently not established.

Members of this genus have been recorded as mainly aphid predators, but they are also predators of Psyllidae and scale insects. Specific host records are listed as follows. Aphids; *Acyrtosiphum pisum* (Harris), *Aphis gossypii* Glover, *Aphi nerii* Boyer de Fonscolombe, *Aphis pomi* de Geer, *Aphis punicae* Passerini, *Amphorophora oleraceae* (Van der Goot), *Cinara laricicola* (Matsumura), *Cinara todocola* (Ihouye), *Cryptosiphum gallarum* (Kaltenbach), *Eriosoma lanigerum* (Hausmann), *Hyadaphis erysimi* (Kaltenbach), *Hyalopterus pruni* (Geoffroy), *Macrosiphum ibarae* Matsumura, *Megoura crassicauda* Mordvilko, *Melanaphis sacchari* (Zehntner), *Myzus malisucta* Matsumura, *Myzus persicae* (Sulzer), *Neophyllaphis podocarpi* Takahashi, *Nipopolachnus piri* Matsumura, *Periphyllus californicus* David, *Rhopalosiphum padi* (L.), *Toxoptera piricola* Matsumura. Scale insects; *Chrysomphalus aonidum* (L.), *Dactylopius* sp., *Icerya purchasi* Maskell, "*Lecanium*" sp., *Phenacoccus pergandei* Cockerell, *Pulvinaria* sp., *Saccharicoccus sacchari* (Cockerell). Psyllidae; *Anomoneura mori* Schwarz. The genus has been treated in part by Iablokoff-Khnzorian (1982) who has synonymized *Leis* with *Harmonia*.

Harmonia dimidiata (F.)

Fig. 675a-c, 676 a, b; Map, Fig. 673

Coccinella dimidiata F., 1781, p. 94.*Leis dimidiata*: Mulsant, 1850, p. 242.—Mulsant, 1866, p. 174.—Crotch, 1874b, p. 119.—Mader, 1934, p. 307.—Korschefsky, 1932, p. 273.*Leis dimidiata* ab. *quindecimmaculata*: Korschefsky, 1932, p. 274.*Coccinella 15-maculata* Hope, 1831, p. 30.*Leis quindecimmaculata*: Mulsant, 1850, p. 246.*Coccinella 15-spilota* Hope, 1831, p. 30.*Leis quindecimspilota*: Mulsant, 1850, p. 248.—Sicard, 1912, p. 500.—Korschefsky, 1932, p. 274.*Harmonia dimidiata*: Iablokoff-Khnzorian, 1982, p. 484.

Diagnosis. Length 7.40 to 10.0 mm, width 6.20 to 9.0 mm. Dorsum reddish yellow with black maculae as in Figure 676a. Male genitalia as in Figure 675a-c. Female genitalia as in Figure 676b.

Discussion. The status of the names included as subspecies or synonyms of *H. dimidiata* is doubtful at best, and I've not attempted to examine the types of these names. Korschefsky (1932) and Iablokoff-Khnzorian (1982) should be consulted for synonymy.

Type locality. Nepal.

Type depository. Type not examined.

Distribution. Figure 673. FLORIDA: Auburndale; Ocoee; Orlando; Winter Garden; Winter Park.

Genus *Neoharmonia* Crotch

Neoharmonia Crotch, 1871, p. 2.—Rye, 1873, p. 329.—Timberlake, 1943, p. 20.—Gordon, 1974b, p. 166.—J. Chapin, 1974, p. 60. Type-species: *Harmonia viridipennis* Mulsant, by subsequent designation of Rye, 1873.

Agrabia Casey, 1899, p. 87.—Leng, 1903b, p. 196.—Korschefsky, 1932, p. 438.—Gordon, 1974b, p. 166. Type-species; *Harmonia cyanoptera* Mulsant, by monotypy.

Neoharmonia Casey, 1899, p. 90 (not *Neoharmonia* Crotch).—Leng, 1920, p. 216.—Timberlake, 1943, p. 20.—Wingo, 1952, p. 23. Type-species; *Coccinella venusta* Melsheimer, by subsequent designation of Timberlake, 1943.

Harmoniaspis Casey, 1908, p. 404.—Korschefsky, 1932, p. 575.—Blackwelder, 1945, p. 455.—Gordon, 1974b, p. 166. Type-species: *Harmonia ampla* Mulsant, by subsequent designation of Gordon, 1974b.

Coccinella (*Neoharmonia*): Leng, 1903b, p. 201.—Korschefsky, 1932, p. 440.

Coccinellini with length 4.50 to 7.00 mm; form elongate, oval, depressed. Anterolateral angle of clypeus produced forward. Pronotum and elytron with lateral margin weakly explanate, usually semitransparent or at least pale in color; epipleuron descending externally. Intercoxal process of prosternum with narrow lateral ridge extending anteriorly as far as anterior margin of coxa, median area nearly flat. Apical margin of mesosternum ridged, arcuately emarginate medially for reception of prosternal process. Apex of middle and hind tibia each without spurs. Tarsal claw with

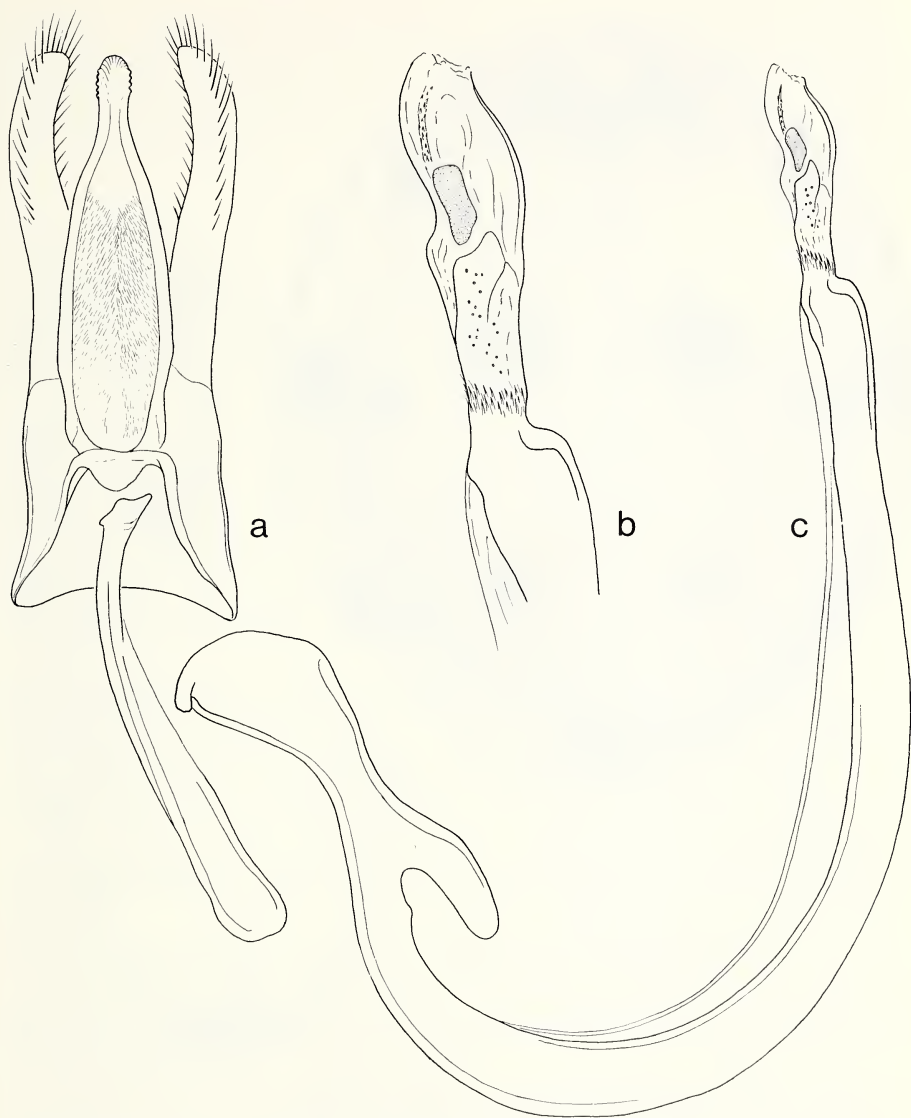


Fig. 675. *Harmonia dimidiata* (male genitalia).

basal, subquadrate tooth. Postcoxal line incomplete, of *Scymnobi* type, but with median intersecting line (Fig. 677a). Male genitalia symmetrical. Female genitalia lacking infundibulum, base of spermathecal capsule terminating in well developed ramus (Fig. 677e).

Neoharmonia is easily recognized by the key characters; in addition, the dorsal color pattern, although variable, is usually distinct from that of other North American

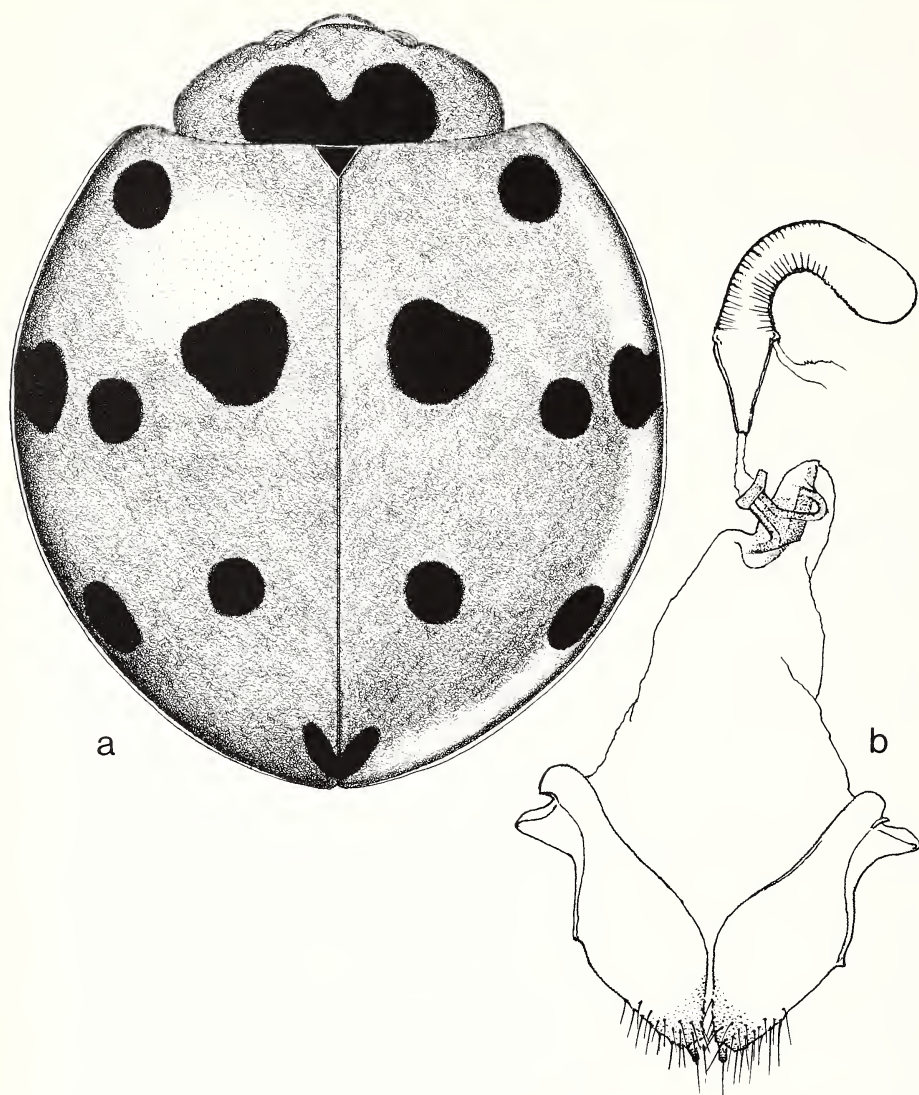


Fig. 676. *Harmonia dimidiata* (habitus and female genitalia).

Coccinellini. *Neoharmonia* is a genus restricted to the Western Hemisphere with *N. venusta venusta* and *N. venusta ampla* occurring north of Mexico. The total number of species in the genus is a matter of conjecture at present, but there are probably less than 5. Members of *Neoharmonia* have been presumed to be predators of aphids and possibly scale insects, but specific host data has been lacking. Whitehead and Duffield (1982) reported *N. venusta venusta* as a major predator of the willow leaf beetle, *Plagiodera versicolora* (Laicharteg). The genus north of Mexico was reviewed by Gordon (1974b).

KEY TO SUBSPECIES OF *Neoharmonia venusta* (MELSHEIMER)

1. Color of pronotum either mostly black (Fig. 677d), or pale with black spots as in Figure 677b; eastern U.S. to eastern Texas *venusta venusta* (Melsheimer)
- Color of pronotum either entirely pale or pale with red or brown spots as in Figure 678e–g; southwestern U.S. and northern Mexico *venusta ampla* (Mulsant)

Neoharmonia venusta venusta (Melsheimer)

Fig. 677a–e, 678; Map, Fig. 673

Coccinella venusta Melsheimer, 1847, p. 178.—Crotch, 1874b, p. 108.—Gorham, 1891, p. 156.—Blackwelder, 1945, p. 454.

Harmonia notulata Mulsant, 1850, p. 83.

Harmonia venusta: Mulsant, 1856, p. 141.—Mulsant, 1866, p. 61.

Neoharmonia venusta: Crotch, 1871, p. 2.—Casey, 1899, p. 71.—Leng, 1920, p. 216.—Wingo, 1952, p. 45.

Neoharmonia notulata: Crotch, 1871, p. 3.—Casey, 1899, p. 91.

Coccinella notulata: Crotch, 1874b, p. 108.

Neoharmonia venusta var. *dissimila* Blatchley, 1914, p. 65.—Leng, 1920, p. 216.—Gordon, 1974b, p. 169.

Neoharmonia venusta var. *fattigi* Blatchley, 1920, p. 43.—Gordon, 1974b, p. 169.

Neoharmonia venusta var. *centralis* Casey, 1924, p. 127.—Gordon, 1974b, p. 169.

Coccinella (*Neoharmonia*) *notulata*: Leng, 1903b, p. 202.—Korschefsky, 1932, p. 514.

Coccinella (*Neoharmonia*) *venusta*: Leng, 1903b, p. 202.—Korschefsky, 1932, p. 514.

Coccinella (*Neoharmonia*) *venusta* ab. *dissimila*: Korschefsky, 1932, p. 541.

Coccinella (*Neoharmonia*) *venusta* ab. *fattigi*: Korschefsky, 1932, p. 541.

Coccinella (*Neoharmonia*) *venusta* ab. *centralis*: Korschefsky, 1932, p. 541.

Neoharmonia venusta venusta: Gordon, 1974b, p. 169.—J. Chapin, 1974, p. 60.

Color pattern variable as in Figure 677b–d. Male genitalia as in Figure 678a–d. Female genitalia as in Figure 677e. For a more detailed discussion see Gordon (1974b).

There are 3 types of *centralis* in the Casey collection, the first of these is here designated and labeled as the lectotype, the other 2 as paralectotypes.

Type locality. Of *venusta*, Pennsylvania; of *notulata*, Louisiana; of *dissimila*, Lake Okeechobee, Florida; of *fattigi*, Pahokee, Florida; of *centralis*, Illinois, 20 miles south of St. Louis (lectotype here designated).

Type depository. Of *venusta*, not located; of *notulata*, not located; of *dissimila* and *fattigi*, PU; of *centralis*, USNM (35523).

Distribution. Figure 673. Maine to Florida, west to Michigan, Nebraska and eastern Texas.

Neoharmonia venusta ampla (Mulsant)

Fig. 678e–g; Map, Fig. 673

Harmonia ampla Mulsant, 1850, p. 81.—Mulsant, 1866, p. 61.

Harmonia cyanoptera Mulsant, 1850, p. 82.—Mulsant, 1866, p. 61.—Gordon, 1974b, p. 169.

Harmonia viridipennis Mulsant, 1866, p. 60.

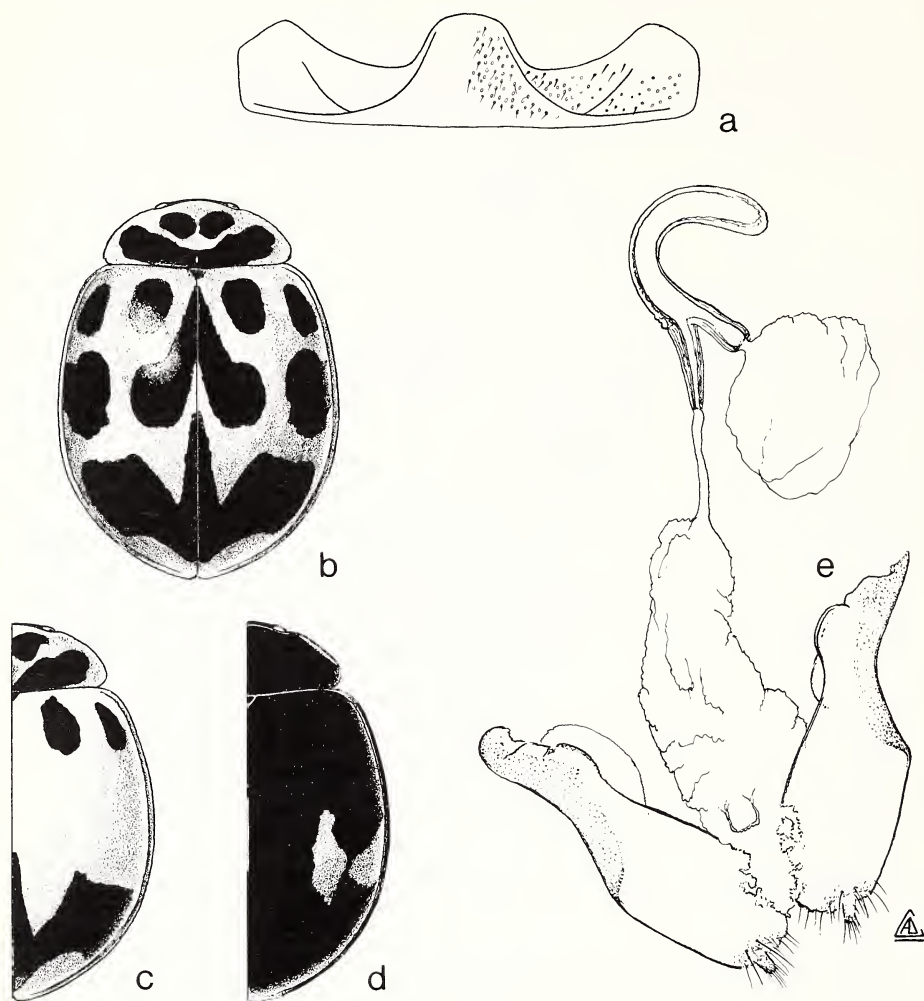


Fig. 677. *Neoharmonia venusta venusta*. a. Postcoxal lines. b-d. Habitus and variations. e. Female genitalia.

Harmonia soularyi Mulsant, 1866, p. 63.

Coccinella cyanoptera: Crotch, 1873, p. 373.—Crotch, 1874b, p. 108.—Gorham, 1891, p. 155.

Coccinella viridipennis: Crotch, 1874b, p. 108.

Coccinella soularyi: Crotch, 1874b, p. 109.—Gorham, 1891, p. 156.

Coccinella ampla: Crotch, 1874b, p. 108.—Gorham, 1891, p. 156.—Blackwelder, 1945, p. 454.

Agrabia cyanoptera: Casey, 1899, p. 87.—Leng, 1903, p. 196.—Leng, 1920, p. 217.—Korschefsky, 1932, p. 438.—Blackwelder, 1945, p. 454.

Neharmonia cyanoptera: Timberlake, 1943, p. 20.

Neoharmonia ampla: Leng, 1920, p. 216.

Agrabia cyanoptera ab. *viridipennis*: Korschefsky, 1932, p. 438.

Coccinella (*Neoharmonia*) *ampla*: Leng, 1903b, p. 202.—Korschefsky, 1932, p. 509.

Coccinella (*Neoharmonia*) *soularyi*: Korschefsky, 1932, p. 509.

Coccinella ampla var. *rufa* Nunenmacher, 1944, p. 146.—Gordon, 1974b, p. 169.

Neoharmonia venusta ampla: Gordon, 1974b, p. 169.

Color pattern variable as in Figure 678e–g. Male and female genitalia identical to those of *N. v. venusta* (Fig. 678a–d). For more detailed discussion see Gordon (1974b). One type specimen of *viridipennis* (female, lacking head and thorax) labeled “Type/Harmonia viridipennis/2209(green paper)/Mexico, Salle Coll./B.C.A., Col., VII. Coccinella cyanoptera m/Harmonia viridipennis Muls Salle Type” has been located and here designated and labeled as the lectotype.

Type locality. Of *ampla*, Mexico; of *cyanoptera*, Mexico; of *soularyi*, Playa Vicente, Mexico; of *viridipennis*, Mexico (lectotype here designated); of *rufa*, Oaxaca, Mexico.

Type depository. Of *ampla*, *cyanoptera*, and *soularyi*, UCCC; of *viridipennis*, BMNH; of *rufa*, CAS.

Distribution. Figure 673. ARIZONA: Clemenceau; Douglas; Globe; Huachuca Mts.; Cochise Co.; Palmerlee; San Bernardino Ranch; Sabino Canyon. NEW MEXICO: Albuquerque; Grant Co.; Santa Rosa. TEXAS: Davis Mts.; Brownsville; Presidio.

Genus *Aphidecta* Weise

Aphidecta Weise, 1899b, p. 375 (emendation).—Korschefsky, 1932, p. 373.—Iablokoff-Khnzorian, 1982, p. 307. Type-species; *Coccinella oblitterata* L., by monotypy. *Aphideita* Weise, 1893, p. 107 (incorrect spelling).

Coccinellini with length 3.60 to 5.60 mm; form elongate, somewhat flattened. Dorsal color variable but usually yellow with suffused darkened areas. Apex of clypeus broadly, feebly emarginate, anterolateral angle produced forward. Lateral margin of elytron feebly explanate; epipleuron flat. Intercoxal process of prosternum feebly convex, slightly ridged laterally, without carina. Apical margin of mesosternum truncate. Apex of femur extending beyond margin of elytron. Apex of middle and hind tibia each without spurs. Tarsal claw with large, subquadrate basal tooth (Fig. 679b). Postcoxal line on first abdominal sternum complete (Fig. 679a). Male genitalia symmetrical. Female genitalia with small infundibulum; coxal plate rectangular in apical half, stylus distinct (Fig. 680c).

Aphidecta is a palearctic genus containing one species, *A. oblitterata* (L.), according to the current classification. This species has been introduced into Canada and North Carolina for control of *Adelges piceae* (Ratzeburg) (balsam woolly adelgid).

It is apparently established in North America only on Mt. Mitchell in North Carolina (Amman, 1966) in spite of attempts to establish it in various other places in Canada and the United States. The only genus in North America with which *Aphidecta* might be confused is *Mulsantina*, but *Mulsantina* has the postcoxal line incomplete, in *Aphidecta* the postcoxal line is complete, and of the *Pullus* type. Aphid

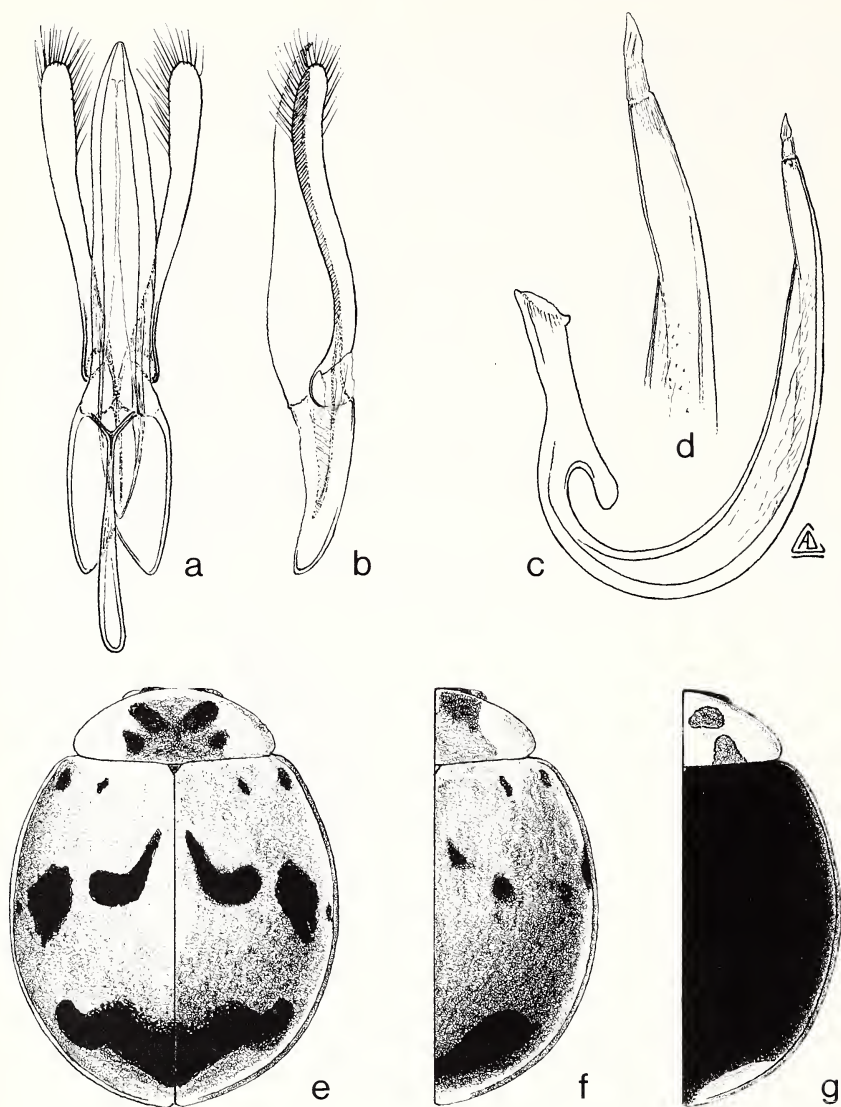


Fig. 678. *Neoharmonia venusta ampla*.

and adelgid species listed as hosts of *A. obliterata* are *Adelges piceae* (Ratzeburg), *Cinera pinicornus* Hartig, *Elatobium abietinum* (Walker), *Pineus pini* (Gmelin).

Aphidecta obliterata (L.)

Fig. 679a-f, 680a-c; Map, Fig. 681

Coccinella obliterata L., 1758, p. 367.

Adalia obliterata: Mulsant, 1850, p. 49.—Crotch, 1874b, p. 99.

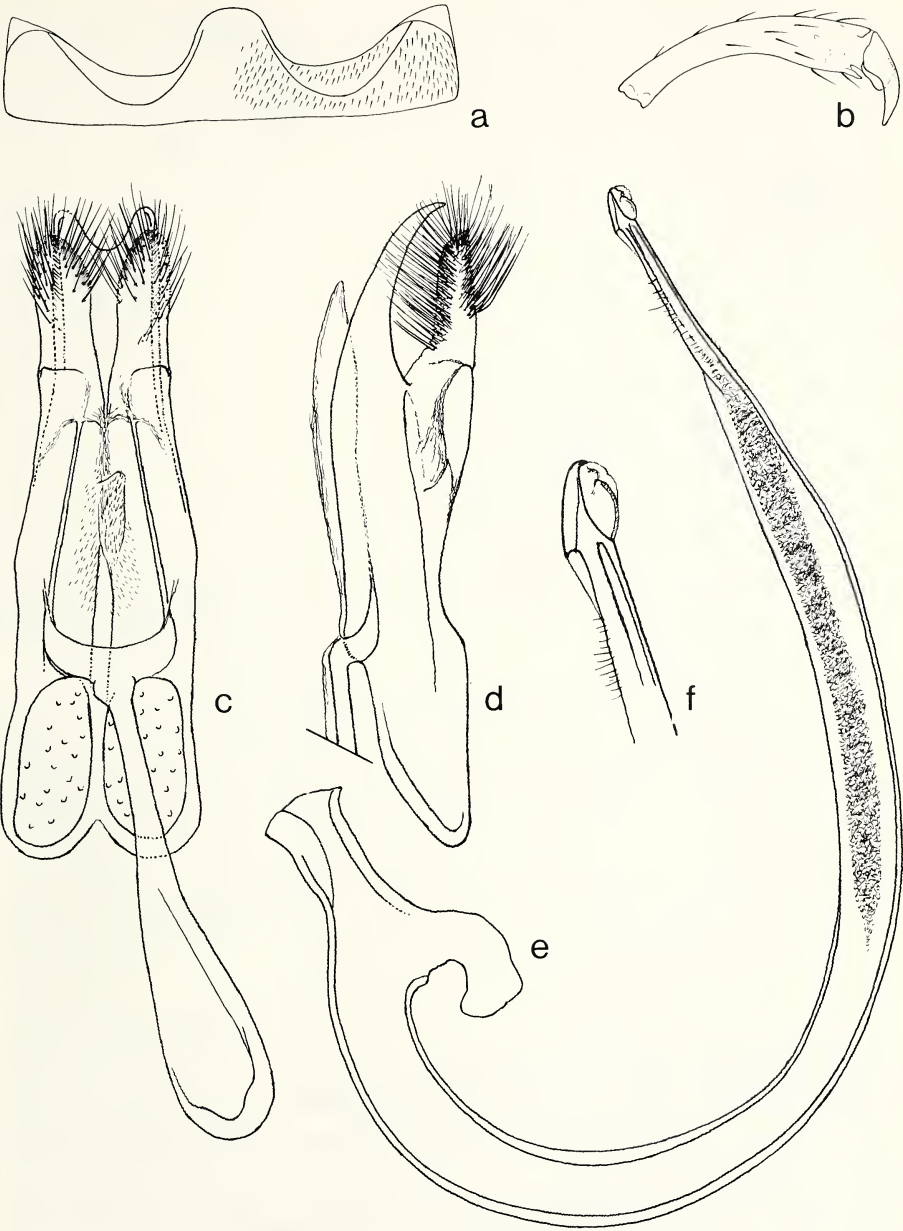


Fig. 679. *Aphidecta obliterata*. a. Postcoxal lines. b. Claw. c-f. Male genitalia.

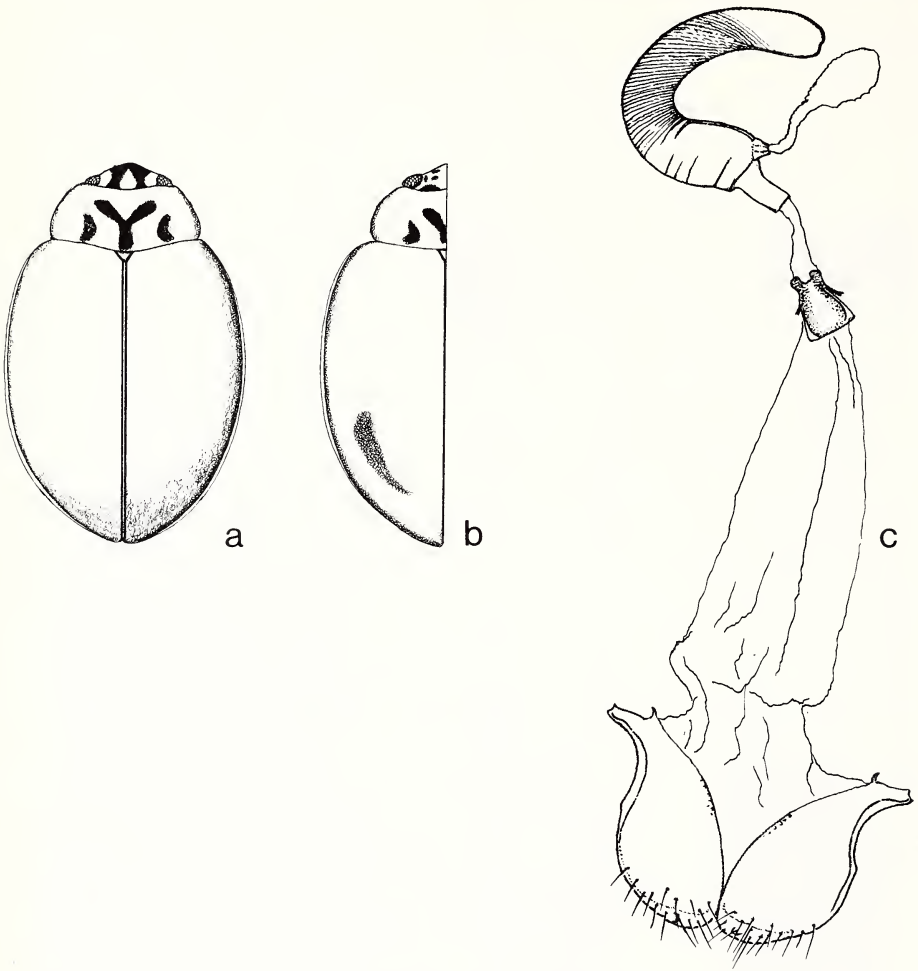


Fig. 680. *Aphidecta obliterata* (habitus and variation, female genitalia).

Aphidecta obliterata: Weise, 1893, p. 106.

Aphidecta obliterata: Weise, 1899b, p. 375.—Korschefsky, 1932, p. 373.

Color pattern as in Figure 680a, b. Male genitalia as in Figure 679c–f. Female genitalia as in Figure 680c.

There are several names listed by Korschefsky (1932) as synonyms or aberrations of *A. obliterata*, refer to Korschefsky for the complete synonymy.

Type locality. "Europa".

Type depository. Type not examined.

Distribution. Figure 681. NORTH CAROLINA: Mt. Mitchell.

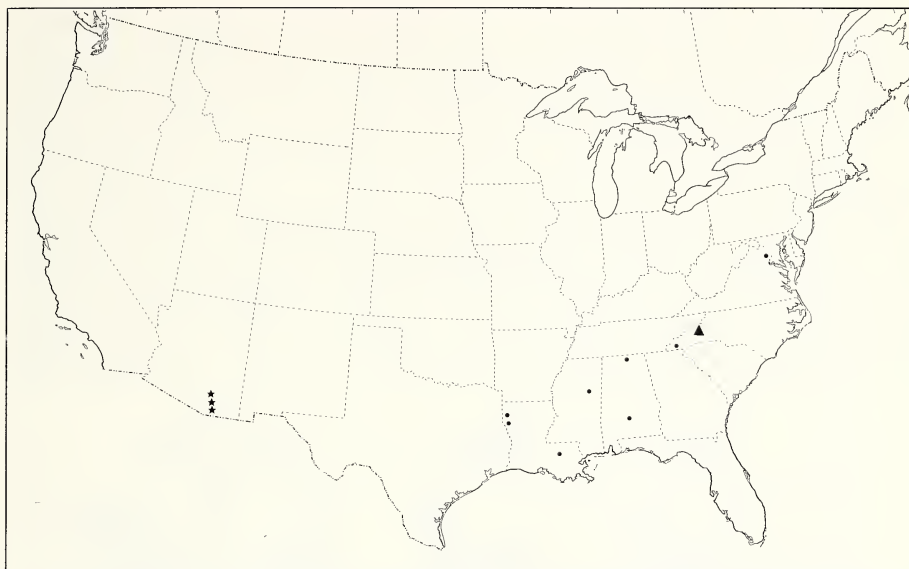


Fig. 681. Distribution. *Aphidecta oblitterata* (triangle); *Mulsantina luteodorsa* (dot); *Mulsantina cyathigera* (star).

Genus *Mulsantina* Weise

Mulsantina Weise, 1906, p. 34.—Korschefsky, 1932, p. 564.—Timberlake, 1943, p. 54.—Hatch, 1961, p. 183.—J. Chapin, 1974, p. 65.—Belicek, 1976, p. 351.

Cleis Mulsant, 1850, p. 208.—Mulsant, 1866, p. 148.—Crotch, 1871, p. 5.—Crotch, 1874b, p. 142.—Gorham, 1892, p. 168.—Casey, 1899, p. 84.—Leng, 1920, p. 217.—Wingo, 1952, p. 23 (not *Cleis* Mulsant, 1850, nor *Cleis* Guérin, 1832). Type-species; *Cleis mirifica* Mulsant, by subsequent designation of Crotch, 1874b.

Pseudocleis Casey, 1908, p. 406.—Leng, 1920, p. 217.—Korschefsky, 1932, p. 564.—Timberlake, 1943, p. 19. Type-species: *Coccinella picta* Randall, by original designation.

Coccinellini with length 3.15 to 5.31 mm. Form elongate to oval, somewhat flattened dorsoventrally. Dorsal color yellow with black or brown maculation. Apex of clypeus truncate, anterolateral angle feebly produced forward. Lateral margins of pronotum and elytron feebly explanate; epipleuron slightly descending externally. Intercostal process of prosternum narrow, convex, without lateral carina. Apical margin of mesosternum weakly emarginate. Apex of femur barely extending beyond margin of elytron. Apex of middle and hind tibia each without spurs. Tarsal claw with small, basal, subquadrate tooth (Fig. 682b). Postcoxal line on first abdominal sternum incomplete (Fig. 682a). Male genitalia symmetrical with extremely long flagellum. Female genitalia without infundibulum, sperm duct extremely long in most species (Fig. 683e).

Mulsantina is a New World genus of 9 species, 4 of which occur north of Mexico. The combination of incomplete postcoxal line and absence of apical spurs on the middle and hind tibiae will distinguish *Mulsantina* from other genera of Coccinellini. *Mulsantina* is a replacement name for *Cleis*. Belicek (1976) stated that *Pseudocleis* Casey was synonymized by Timberlake (1943), but the synonymy was first established by Leng (1920). The preferred prey of members of this genus is uncertain. Both scale insects and aphids have been implicated but I have not seen the results of any definitive studies. Hosts recorded in the literature are listed below. Adelgidae; *Chermes* sp., *Adelges cooleyi* (Gillette), *Adelges piceae* (Ratzeburg), *Pineus strobi* (Hartig). Aphididae; *Dilachnus* spp., *Eulachnus rileyi* (Williams), *Mindarus abietinus* Kock, *Schizolachnus piniradiatae* (Davidson). Scale insects; *Chionaspis pinifoliae* (Fitch), *Lecanium* sp., *Matsucoccus resinosae* Bean and Godwin, *Saissetia oleae* (Olivier), *Coccus hesperidum* L. This genus has been recently revised by J. Chapin (in press).

KEY TO SPECIES OF *Mulsantina*

1. Elytron with 4 to 6 discrete brown spots (Fig. 688f); southern Arizona *cyathigera* (Gorham)
- Elytron variably marked or immaculate, but never with 4 to 6 discrete spots; widely distributed 2
- 2(1). Pronotum with slightly curved black vitta on each side of middle (Fig. 687f); elytron immaculate *luteodorsa* J. Chapin
- Pronotum not as described above; elytron rarely immaculate 3
- 3(2). Pronotum with median, black, M-shaped mark and lateral spot attached to M-shaped mark or broken into component spots (Fig. 682d); elytron variable but rarely with median vitta, transverse vitta usually joined across suture *picta* (Randall)
- Pronotum usually with median, black, M-shaped mark broken into several irregular spots with dash above each lateral leg near anterior pronotal margin (Fig. 685f); elytron with median vitta, and spot near vitta near middle plus one behind middle near anterior margin *hudsonica* (Casey)

Mulsantina picta (Randall)

Fig. 682a–e, 683a–e; Map, Fig. 684

Coccinella picta Randall, 1838, p. 51.—LeConte, 1850, p. 238.—LeConte, 1852, p. 131.—Crotch, 1874b, p. 105.—Gorham, 1891, p. 154.

Harmonia picta: Mulsant, 1850, p. 1017.—Mulsant, 1856, p. 141.—Mulsant, 1866, p. 65.—Crotch, 1873, p. 373.—Wickham, 1894, p. 303.—Leng, 1903b, p. 205.

Neoharmonia picta: Crotch, 1871, p. 2.

Cleis picta: Casey, 1899, p. 95.—Bowditch, 1902, p. 206.—Schaeffer, 1905, p. 143.—Johnson, 1910, p. 72.—Leng, 1920, p. 217.—Stehr, 1930, p. 40.—Wingo, 1952, p. 46.

Pseudocleis picta: Casey, 1908, p. 406.

Mulsantina picta: Korschefsky, 1932, p. 565.—Timberlake, 1943, p. 19.—Blackwelder, 1945, p. 453.—Hatch, 1961, p. 183.—J. Chapin, 1974, p. 66.—Belicek, 1976, p. 350.—Laroche, 1979, p. 55, 81.

Coccinella concinnata Melsheimer, 1847, p. 177.

Harmonia contexta Mulsant, 1850, p. 87, 1017.

Coccinella picta var. *impictipennis* Weise, 1895, p. 125.

Mulsantina picta ab. *impictipennis*: Korschefsky, 1932, p. 565.

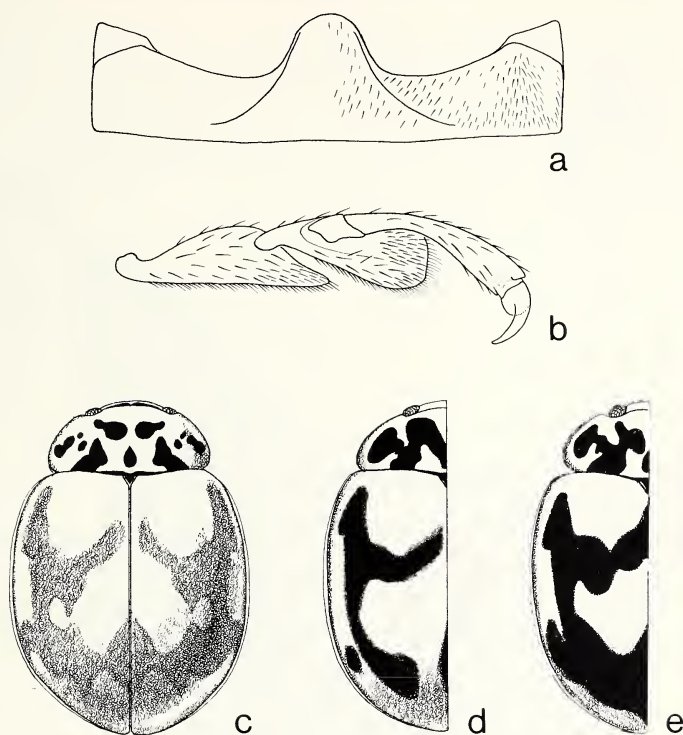


Fig. 682. *Mulsantina picta*. a. Postcoxal lines. b. Tarsus. c-e. Habitus and variation.

Cleis picta var. *blanchardi* Johnson, 1910, p. 72.

Cleis minor Casey, 1899, p. 95.

Cleis picta var. *minor*: Bowditch, 1902, p. 206.—Schaeffer, 1905, p. 143.—Johnson, 1910, p. 72.—Leng, 1920, p. 217.

Harmonia picta var. *minor*: Leng, 1903b, p. 205.

Cleis picta minor: Dobzhansky, 1935, p. 335.—Malkin, 1943, p. 197.

Mulsantina picta ab. *minor*: Korschefsky, 1932, p. 565.—Blackwelder, 1945, p. 453.

Mulsantina picta minor: Timberlake, 1943, p. 19.—Hatch, 1961, p. 183.

Cleis picta nubilata Casey, 1924, p. 158.

Mulsantina picta nubilata: Korschefsky, 1932, p. 565.

Mulsantina picta ab. *nubilata*: Blackwelder, 1945, p. 453.

Cleis concolor: Gaines, 1933, p. 263 (misidentification).

Diagnosis. Length 3.32 to 5.31 mm, width 2.24 to 3.98 mm. Color yellow except head with black spot on each side of clypeus, spot narrowly connected to black vertex; pronotum with black, median, M-shaped mark, lateral spot connected to M-shaped mark; elytron extremely variable from heavily maculate to immaculate (Fig. 682c-e). Male genitalia as in Figure 683a-c. Female genitalia as in Figure 683e.

Discussion. The elytral color pattern is extremely variable, but the pronotal markings are quite constant and afford an easy means of recognition.

Type locality. Of *picta*, Chelsea Beach, Massachusetts; of *concinata*, Pennsylvania;

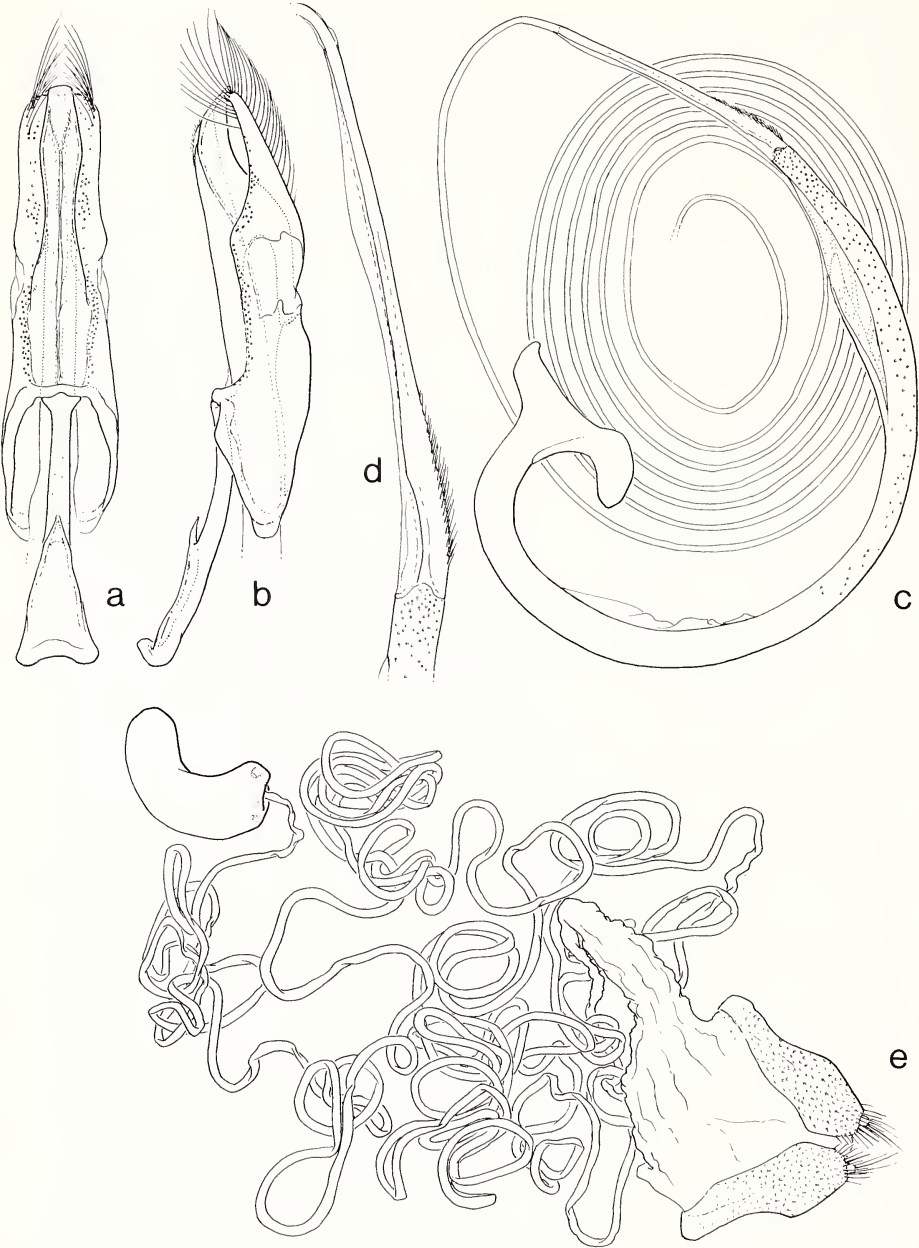


Fig. 683. *Mulsantina picta*.



Fig. 684. Distribution. *Mulsantina picta*.

of *contexta*, "Mexique"; of *impictipennis* and *blanchardi*, not given; of *minor*, Siskiyou Co., California; of *nubilata*, Mexico.

Type depository. Of *picta* and *concinata*, types not located; of *contexta*, UCCC; of *impictipennis* and *blanchardi*, types not designated; of *minor* (35534) and *nubilata* (35535) USNM.

Distribution. Figure 684. New Brunswick to Florida, west to Yukon Territory and California.

Mulsantina hudsonica (Casey)

Fig. 685a-f; Map, Fig. 686

Cleis hudsonica Casey, 1899, p. 95.—Schaeffer, 1905, p. 197, 1920, p. 217.

Cleis picta var. *hudsonica*: Leng, 1903b, p. 206.

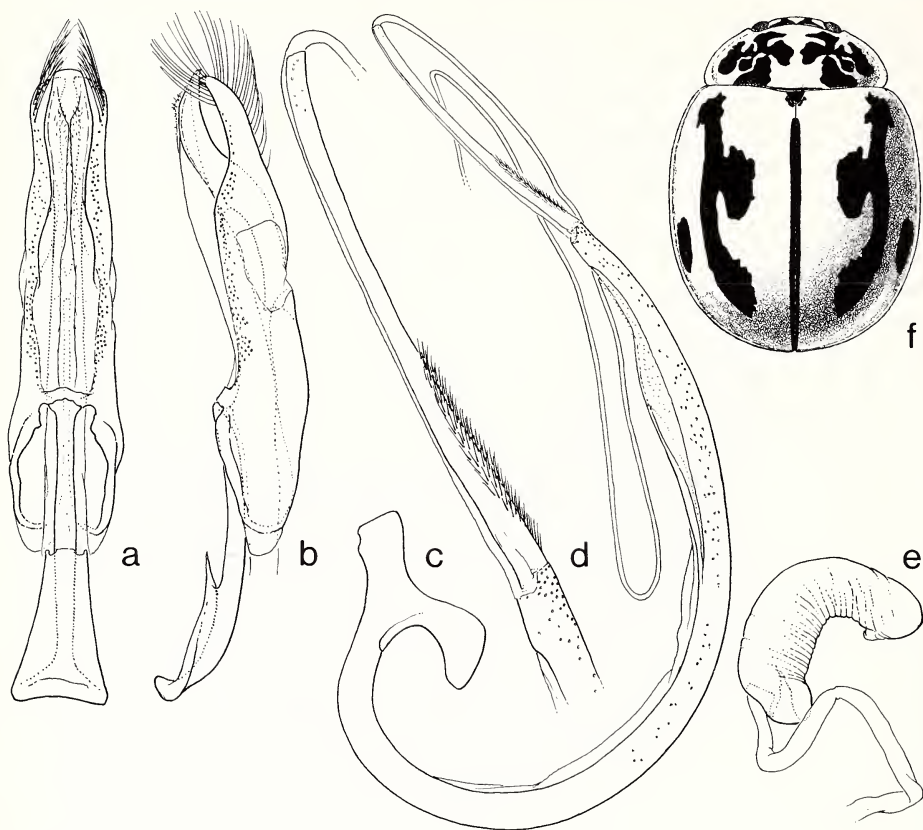


Fig. 685. *Mulsantina hudsonica*.

Pseudocleis hudsonica: Casey, 1908, p. 406.

Mulsantina hudsonica: Korschefsky, 1932, p. 564.—Hatch, 1961, p. 183.—Belicek, 1976, p. 351.

Diagnosis. Length 3.49 to 4.98 mm, width 3.0 to 3.60 mm. Color yellow except head with 2 interrupted black lines on face connected to black vertex; pronotum typically with irregular, black spots medially forming M-shaped design, irregular black blotch laterally, markings variable; elytron with median brown vitta and 2 black spots, one medially, often connected to vitta, one near lateral margin in apical $\frac{1}{2}$ (Fig. 685f). Male genitalia as in Figure 685a–d. Female genitalia as in Figure 685e.

Discussion. The dorsal color pattern is variable, but the vitta on the elytron is constant as is the broken M-shaped mark on the pronotum. This species was described from a unique specimen (holotype).

Type locality. “H. B.” (Hudson Bay).

Type depository. USNM (35536).

Distribution. Figure 686. Labrador to North Carolina, west to British Columbia.

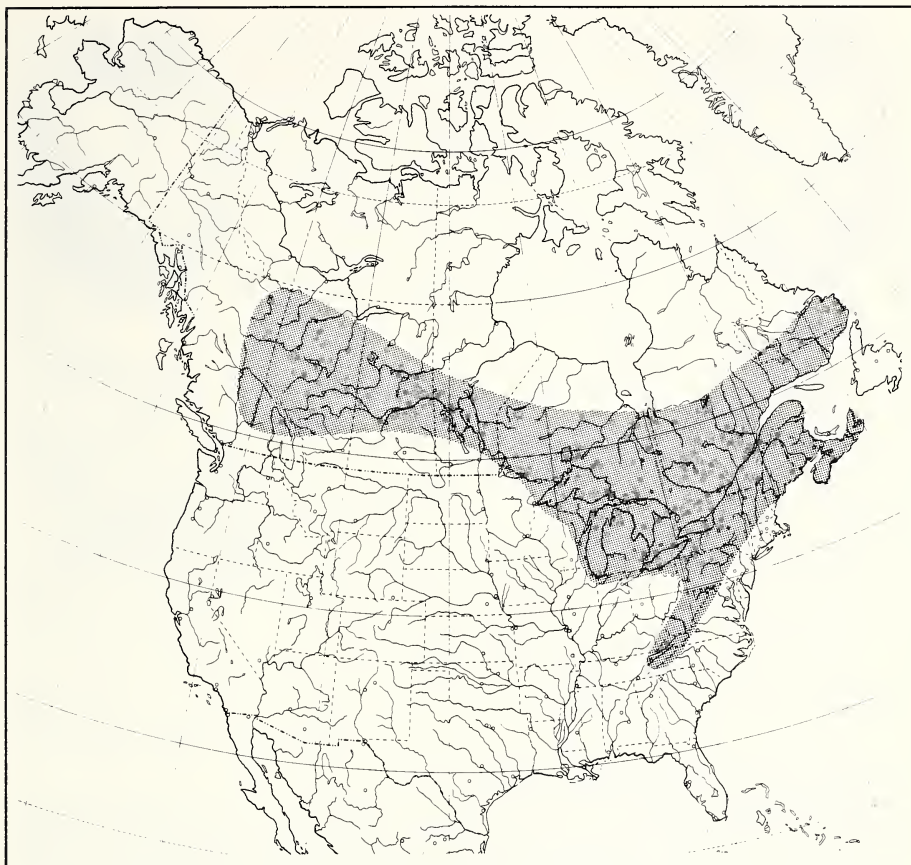


Fig. 686. Distribution. *Mulsantina hudsonica*.

Mulsantina luteodorsa J. Chapin

Fig. 687a-f; Map, Fig. 681

Mulsantina luteodorsa J. Chapin, 1973, p. 1073.—J. Chapin, 1974, p. 67.

Diagnosis. Length 3.80 to 4.60 mm, width 2.99 to 3.40 mm. Form rounded, somewhat elongate. Male head yellow except vertex black, female head yellow with vertex and clypeus black or brown; pronotum yellow with slightly curved black vitta on each side of middle, vittae sometimes joined basally and a black spot in each lateral pale area (Fig. 687f); elytron yellowish orange, immaculate; ventral surface black or brown except mouthparts, pro- and mesosternum, epipleuron, and leg yellow (in female). Male genitalia as in Figure 687a–d. Female genitalia as in Figure 687e.

Discussion. The immaculate elytron of *M. luteodorsa* is unique within the genus except for some specimens of *M. picta*, and causes this species to resemble members of *Cycloneda*.

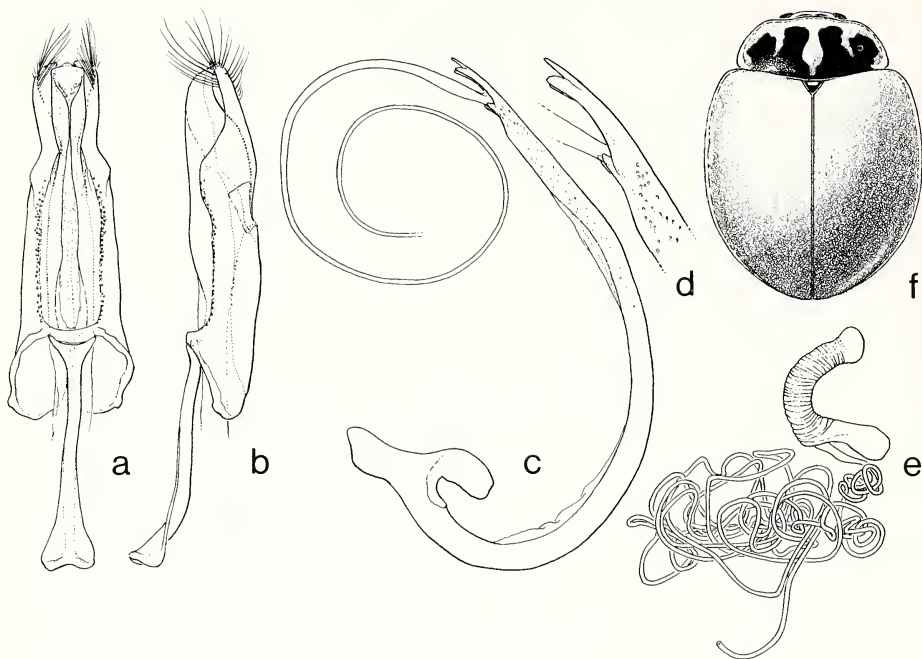


Fig. 687. *Mulsantina luteodorsa*.

Type locality. Baton Rouge, Louisiana.

Type depository. USNM.

Distribution. Figure 681. ALABAMA: Hagen; Madison Co., Monte Sano St. Pk. LOUISIANA: Baton Rouge; Many; Shreveport. MISSISSIPPI: Starkville. NORTH CAROLINA: Macon Co. VIRGINIA: Vienna.

Mulsantina cyathigera (Gorham)

Fig. 688a-f; Map, Fig. 681

Coccinella cyathigera Gorham, 1891, p. 158.—Gordon, 1974b, p. 165.

Harmoniaspis cyathigera: Casey, 1908, p. 404.

Coccinella (*Neoharmonia*) *cyathigera*: Korschevsky, 1932, p. 510.

Mulsantina cyathigera: Blackwelder, 1945, p. 453.—J. Chapin (in press).

Diagnosis. Length 3.32 to 4.65 mm, width 2.57 to 3.40 mm. Color yellow except pronotum with median, brown, M-shaped marking; elytron with 6 brown spots (Fig. 688f), spots sometimes reduced and with median and lateral or one or both missing; ventral surface and leg reddish yellow. Male genitalia as in Figure 688a-d. Female genitalia as in Figure 688e.

Discussion. This species occurs from Guatemala to southern Arizona. The finely

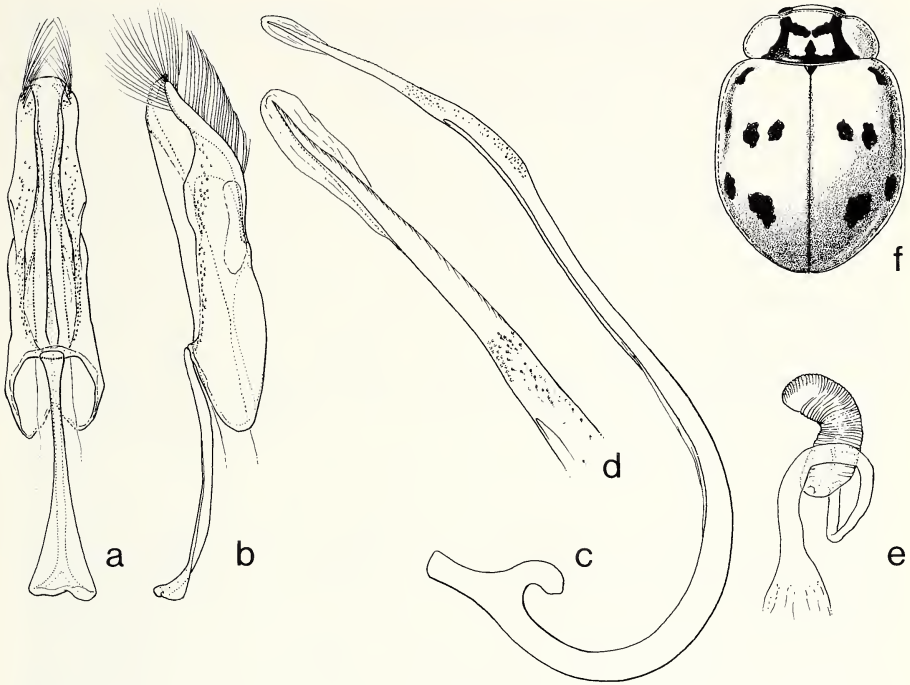


Fig. 688. *Mulsantina cyathigera*.

defined M-shaped mark on the pronotum and discrete elytral spots are characteristic of *M. cyathigera* which resembles large species of *Psyllobora* or *Olla* more than it does other species of *Mulsantina*.

Type locality. Guatemala: Quezaltenango and Quiche Mts. (lectotype not designated).

Type depository. BMNH.

Distribution. Figure 681. ARIZONA: Chiricahua Mts.; Graham Mts.; Huachuca Mts.; Santa Catalina Mts.; Santa Rita Mts.

Tribe Psylloborini

Psylloborini Casey, 1899, pp. 73, 100.—Leng, 1920, p. 215.—Korschefsky, 1932, p. 558.—Wingo, 1952, p. 22.—Sasaji, 1968, p. 21, 31.—J. Chapin, 1974, p. 69. Halzyiini Capra, 1927, p. 158.—Korschefsky, 1932, p. 558.

Coccinellinae with body length usually 3.0 mm or less. Head with gena not extending onto eye (Fig. 558a); eye coarsely faceted; mandible with 5 teeth, 2 apical, 3 internal; clypeus wider than frons, apex without produced anterolateral angle (Fig. 558a). Anterior border of pronotum feebly emarginate, partially concealing head.

One genus represents this tribe north of Mexico, but others occur worldwide, mainly

in tropical regions. In North America the *Psylloborini* are likely to be confused only with the *Coccinellini* (see discussion under the latter tribe).

Genus *Psyllobora* Dejean

Psyllobora Dejean, 1836, p. 458.—LeConte, 1852, p. 130.—Crotch, 1873, p. 375.—1874b, p. 135.—Gorham, 1892, p. 165.—Wickham, 1894, p. 299.—Casey, 1899, p. 100.—Leng, 1903b, p. 210.—Blatchley, 1910, p. 517.—Leng, 1920, p. 215.—Korschefsky, 1932, p. 565.—Timberlake, 1943, pp. 41, 59.—Wingo, 1952, p. 22.—J. Chapin, 1974, p. 69.—Belicek, 1976, p. 352.—Iablokoff-Khnzorian, 1982, p. 299. Type-species; *Coccinella lineola* F., by subsequent designation of Timberlake (1943).

Psyllobora (*Psyllobora*) Mulsant, 1850, p. 169.—Mulsant, 1866, p. 128.

Thea Mulsant, 1846, p. 159.—Mulsant, 1850, p. 162.—Casey, 1899, p. 100.—Gorham, 1892, p. 165.—Timberlake, 1943, pp. 41, 59.—Fursch, 1966, p. 90. Type-species; *Coccinella vigintiduopunctata* L., by subsequent designation of Crotch, 1874b.

Coccinellini with length 1.80 to 6.50 mm; broadly oval to elongate oval, dorso-ventrally flattened. Color pale yellow with brown maculation on pronotum and elytron. Head pubescent; basal segment of antenna enlarged, somewhat flattened (Fig. 689a). Lateral margin of pronotum broadly explanate, transparent. Lateral margin of elytron usually narrowly explanate, transparent; epipleuron nearly flat. Intercoxal process of prosternum flat, feebly ridged laterally, truncate apically. Apical margin of mesosternum truncate. Apex of middle and hind tibiae each without spurs, claw with basal tooth (Fig. 689b). Postcoxal line incomplete, of *Diomus* type (Fig. 689c). Male genitalia with basal lobe either symmetrical or asymmetrical. Female genitalia with or without infundibulum; coxal plate irregularly elongate with distinct apical stylus (Fig. 691e).

Most of the Western Hemisphere species of this genus are neotropical, but 6 species occur north of Mexico. Because there are many undescribed species in South America, it is not possible to give an accurate estimate of the total number of species in this hemisphere. There are probably over 50. The genus *Psyllobora* as presently constituted is not a monophyletic unit, and systematic research in the group will result in the establishment of one or more additional genera. The North American species are very similar in external appearance but are divergent in genitalic structure. Two groups are evident based on genitalia, the *vigintimaculata* group, composed of the nominate species and possibly *P. nana*, and the *borealis* group, composed of the remaining 4 species. *Psyllobora vigintimaculata* has an extremely long, convoluted spermathecal capsule with a correspondingly long, threadlike siphonal apex in the male. The *borealis* group has a more normal type of spermathecal capsule and the siphonal apex is not long and threadlike. Within the *borealis* group, the female genitalia of *P. borealis* and *P. plagiata* each have an infundibulum, the genitalia of *P. renifer* and *P. parvinotata* lack that structure. Members of *Psyllobora* are known to feed on fungus, particularly the mildew type (Davidson, 1921). Other hosts such as mites, aphids, and scale insects have been recorded in the literature, but much of

this data is a result of inaccurate observation and assumption. Specific fungal host data are listed as follows: *Erysiphe communis* (Wallr.) Fries, *Erysiphe polygoni* D.C., *Erysiphe polygoni* D.C. ex St. Amans, *Erysiphe tortilis* Wallr. ex Fr., *Microsphaera alphitoides* Griff. and Maubl, *Phyllactinia suffulta* (Rabent.) Sacc., *Podosphaera leucotricha* (Ellis & Everh.) Salm., *Podosphaera oxycanthae* (D.C.) DeBy, *Sphaerotheca pannosa* (Wallr. ex Fr.) Lev., *Uncinula nector* (Schw.) Burill.

The genus has not been taxonomically treated as a whole, but Timberlake (1943) constructed a key to the North American species based on male genitalia.

KEY TO SPECIES OF *Psyllobora*

- 1. Elytron with large, common, sutural spot at apical third (Fig. 689g); Greater Antillean species recorded from Florida, rare *nana* Mulsant
- Elytron without large sutural spots at apical third; Florida and elsewhere 2
- 2(1). Elytron with spots strongly coalescent, suffused, at least in apical half, marginal spots usually absent (Fig. 696f) *renifer* Casey
- Elytron with spots not strongly coalescent, marginal spots usually present 3
- 3(2). Form broadly oval; elytron with maculae reduced, only subapical spot large, strongly evident (Fig. 694f); known only from southern Arizona *plagiata* Schaeffer
- Form elongate; elytron with numerous small spots 4
- 4(3). Elytron with strongly developed lateral spot behind middle, spot either free or narrowly connected to large inner spot, widely separated from apical spots (Fig. 693f) *borealis* Casey
- Elytron with lateral spot behind middle usually not strongly developed, narrowly separated from apical spot or spots, or joined to it (Figs. 691f, 695f) 5
- 5(4). Pronotum often without spots (Fig. 695f, g); genitalia as in Figure 695a–d; Florida to Louisiana *parvinotata* Casey
- Pronotum always with spots (Fig. 691f); genitalia as in Figure 691a–d; occurring over most of North America, not known from Florida *vigintimaculata* (Say)

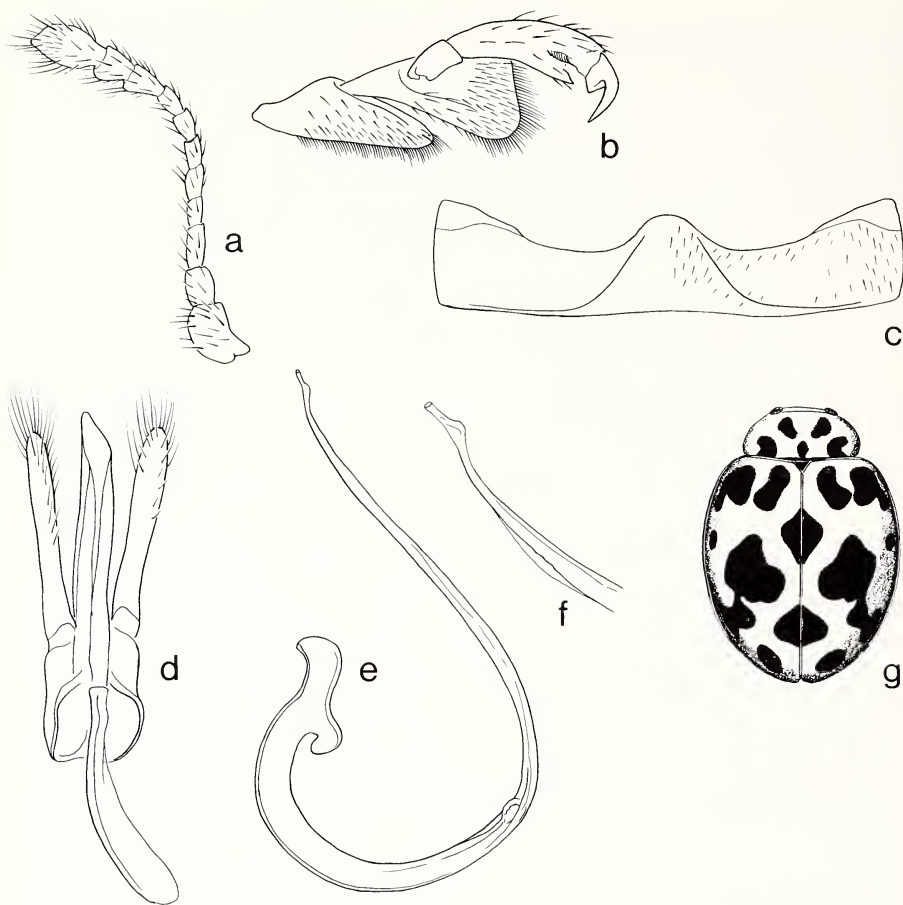


Fig. 689. *Psyllobora* sp. a. Antenna. b. Tarsus. c. Postcoxal lines. d-f. *Psyllobora nana*.

Psyllobora nana Mulsant
Fig. 689d-g; Map, Fig. 690

Psyllobora nana Mulsant, 1850, p. 181.—Mulsant, 1866, p. 137.—Crotch, 1873, p. 376.—Crotch, 1874b, p. 141.—Casey, 1899, p. 102.—Leng, 1903b, p. 211.—Korschefsky, 1932, p. 568.

Diagnosis. Length 2.30 to 2.70 mm, width 1.50 to 1.90 mm. Color pattern as described for *P. vigintimaculata* except elytral spots less coalescent, one spot on suture at apical $\frac{1}{3}$ united with mate on opposite elytron, subapical spot near suture free, large (Fig. 689g). Male genitalia as in Figure 689d-f.

Discussion. This is a distinctive Greater Antillean species that has been recorded from Florida in the literature; one specimen in the Casey collection is labeled "Dry

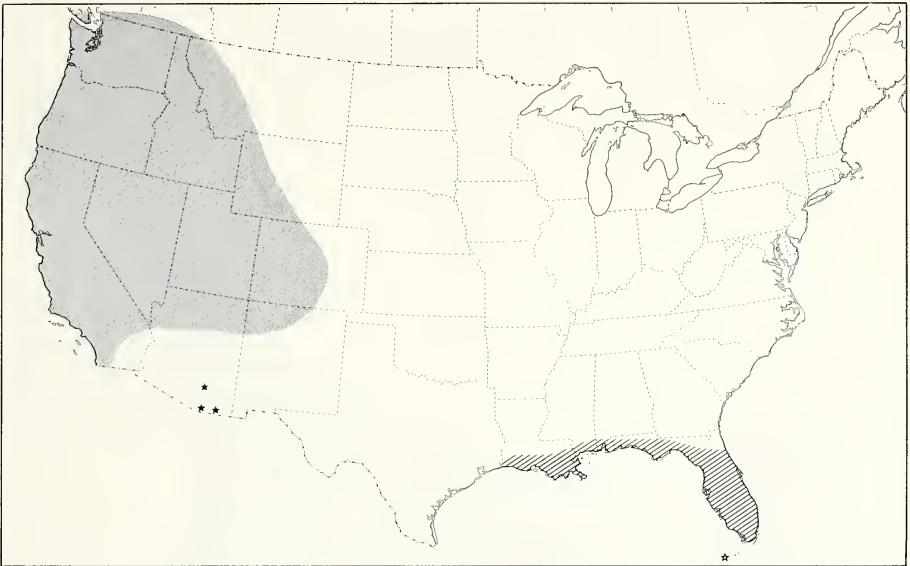


Fig. 690. Distribution. *Psyllobora nana* (open star); *P. borealis* (shaded); *P. plagiata* (star); *P. parvnotata* (cross hatch).

Tortugas, Fla.” A specimen in the Crotch collection labeled “*P. nana* Cuba/TYPE (blue paper)” is here designated and labeled as the lectotype.

Type locality. Cuba (lectotype here designated).

Type depository. UCCC

Distribution. Figure 690. FLORIDA: Dry Tortugas.

Psyllobora vigintimaculata (Say)

Fig. 691a–i; Map, Fig. 692

Coccinella 20-maculata Say, 1824, p. 96.

Psyllobora viginti-maculata: Mulsant, 1850, p. 183.—Mulsant, 1866, p. 137.—Crotch, 1874b, p. 141.—Gorham, 1892, p. 167 (in part).—Timberlake, 1943, p. 42.

Psyllobora 20-maculata: Crotch, 1873, p. 375.—Wickham, 1894, p. 303.—Casey, 1899, p. 101.—Leng, 1903b, p. 210.—Blatchley, 1910, p. 517.—Timberlake, 1943, p. 59.

Psyllobora viginti-maculata: Leng, 1920, p. 215.

Psyllobora vigintimaculata: Korschefsky, 1932, p. 569.—Wingo, 1952, p. 45.—J. Chapin, 1974, p. 70.—Belicek, 1976, p. 353.

Psyllobora taedata LeConte, 1860, p. 70.—Wickham, 1894, p. 306.—Casey, 1899, p. 102.—Leng, 1903b, p. 211.—Timberlake, 1943, pp. 42, 59.

Psyllobora 20-maculata var. *taedata*: Crotch, 1873, p. 376.—Korschefsky, 1932, p. 570.—Hatch, 1961, p. 184.

Psyllobora obsoleta Casey, 1899, p. 101.—Casey, 1908, p. 407.

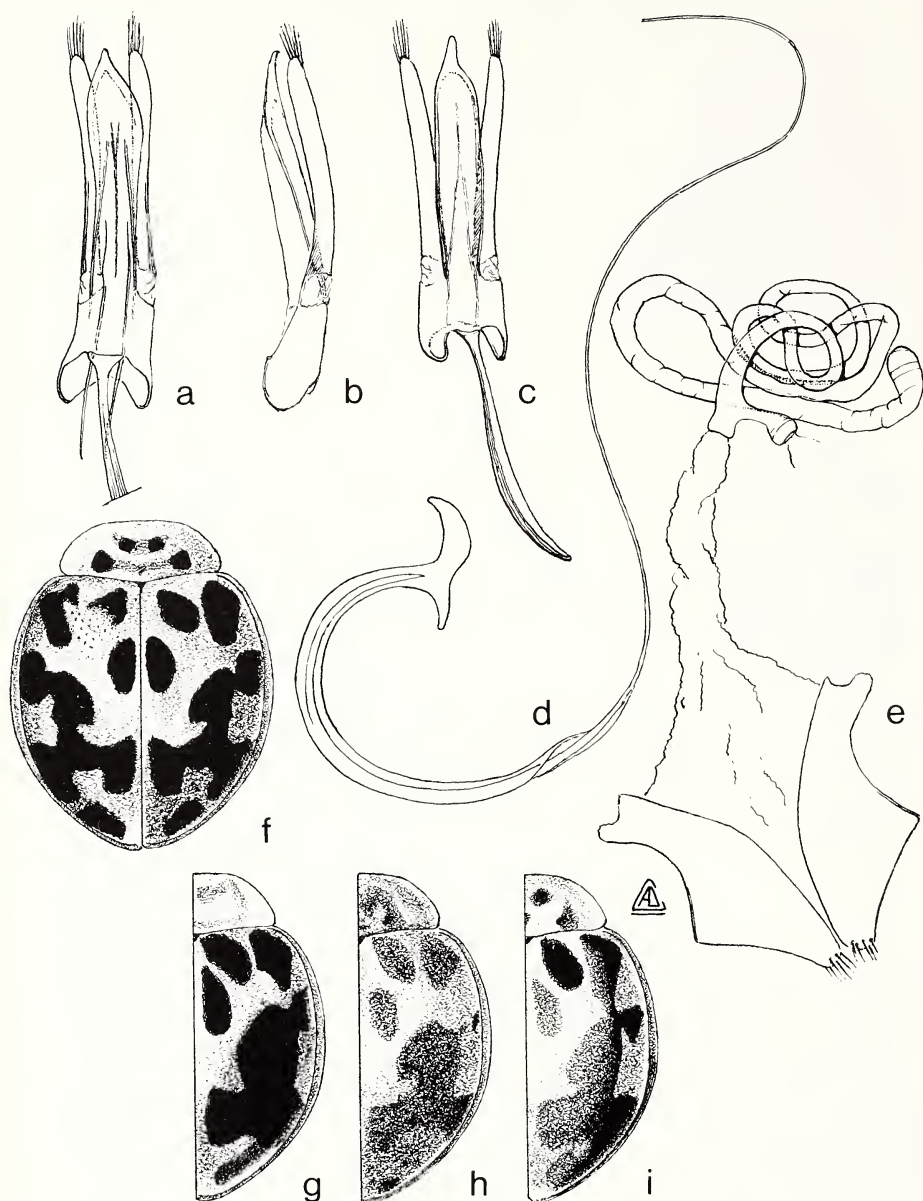


Fig. 691. *Psyllobora vigintimaculata*.

Psyllobora 20-maculata var. *obsoleta*: Leng, 1903b, p. 210.

Psyllobora separata Casey, 1899, p. 102.—Leng, 1903b, p. 211.

Psyllobora taedata separata: Casey, 1908, p. 407.

Psyllobora vigintimaculata ab. *separata*: Korschevsky, 1932, p. 569.



Fig. 692. Distribution. *Psyllobora vigintimaculata*.

Diagnosis. Length 1.75 to 3.0 mm, width 1.40 to 2.35 mm. Pronotum with 4 dark spots; elytron usually with 9 spots, spots partially confluent (Fig. 691f), pattern variable (Fig. 691g-i). Male genitalia as in Figure 691a-d. Female genitalia as in Figure 691e.

Discussion. The dorsal color pattern will usually separate *vigintimaculata* from all other North American species of *Psyllobora* except strongly maculate specimens of *P. parvinotata*, where genitalia must be used. *Psyllobora vigintimaculata* is found throughout the United States (except Florida) and southern Canada with the range extending into Mexico. *Psyllobora taedata* has been considered a synonym or variety of *P. vigintimaculata* by some previous authors, and most recently, Timberlake (1943) regarded *P. taedata* as a valid species. I consider *P. taedata* a junior synonym of *P. vigintimaculata* because the morphological differences between the eastern and western population are gradually clinal and it is impossible to delimit well characterized geographic races.

The types (females) of *P. obsoleta* and *separata* are unique (holotypes). LeConte

had several type specimens of *P. taedata*, therefore I designate and label a specimen labeled "(gold disc)/4639/Type 6691 (red paper)/*P. taedata* LeC." as the lectotype. Three additional specimens bearing gold discs are designated and labeled as paralectotypes.

Type locality. Of *vigintimaculata*, "Missouri"; of *taedata*, San Francisco, California (lectotype here designated); of *obsoleta*, Keokuk, Iowa; of *separata*, Siskiyou Co., California.

Type depository. Of *vigintimaculata*, type lost; of *taedata*, MCZ; of *obsoleta* (35545) and *separata* (35547), USNM.

Distribution. Figure 692. Northern range limit, New Foundland to Alaska; southern range limit, Virginia to Tennessee and Louisiana, west to southern California.

Psyllobora borealis Casey

Fig. 693a-f; Map, Fig. 690

Psyllobora borealis Casey, 1899, p. 102.—Casey, 1908, p. 407.—Timberlake, 1943, pp. 42, 60.—Hatch, 1961, p. 185.—Belicek, 1976, p. 353.

Psyllobora taedata: Leng, 1903b, p. 211.

Psyllobora vigintimaculata ab. *borealis*: Korschefsky, 1932, p. 569.

Psyllobora deficiens Casey, 1899, p. 102.—Casey, 1908, p. 407.—Timberlake, 1943, p. 60.

Psyllobora vigintimaculata ab. *deficiens*: Korschefsky, 1932, p. 569.

Diagnosis. Length 2.40 to 3.10 mm, width 1.90 to 2.40 mm. Description as for *P. vigintimaculata* except form more robust; lateral, submedian spot large, widely separated from subapical spots (Fig. 693f). Male genitalia as in Figure 693a-d. Female genitalia as in Figure 693e.

Discussion. The robust form and elytral color pattern will separate *P. borealis* from *P. vigintimaculata* which it most nearly resembles. The type is a unique (holotype) male. Timberlake (1943) regarded *P. deficiens* as a valid species, but I cannot separate it from *P. borealis* and consider *P. deficiens* a junior synonym of *P. borealis*. The female type of *P. deficiens* is unique (holotype).

Type locality. Of *borealis*, Coeur d'Alene, Idaho; of *deficiens*, California.

Type depository. Of *borealis* (35549) and *deficiens* (35550), USNM.

Distribution. Figure 690. Montana to New Mexico, west to southern British Columbia and southern California.

Psyllobora plagiata Schaeffer

Fig. 694a-f; Map, Fig. 690

Psyllobora plagiata Schaeffer, 1908, p. 125.—Korschefsky, 1932, p. 568.

Psyllobora koebelei Nunenmacher, 1911, p. 71.—Korschefsky, 1932, p. 567.—Timberlake, 1943, p. 60. **New Synonymy.**

Diagnosis. Length 2.50 to 3.10 mm, width 2.20 to 2.50 mm. Description as for *P. vigintimaculata* except form more robust; maculation on elytron strongly reduced (Fig. 694f). Male genitalia as in Figure 694a-d. Female genitalia as in Figure 694e.

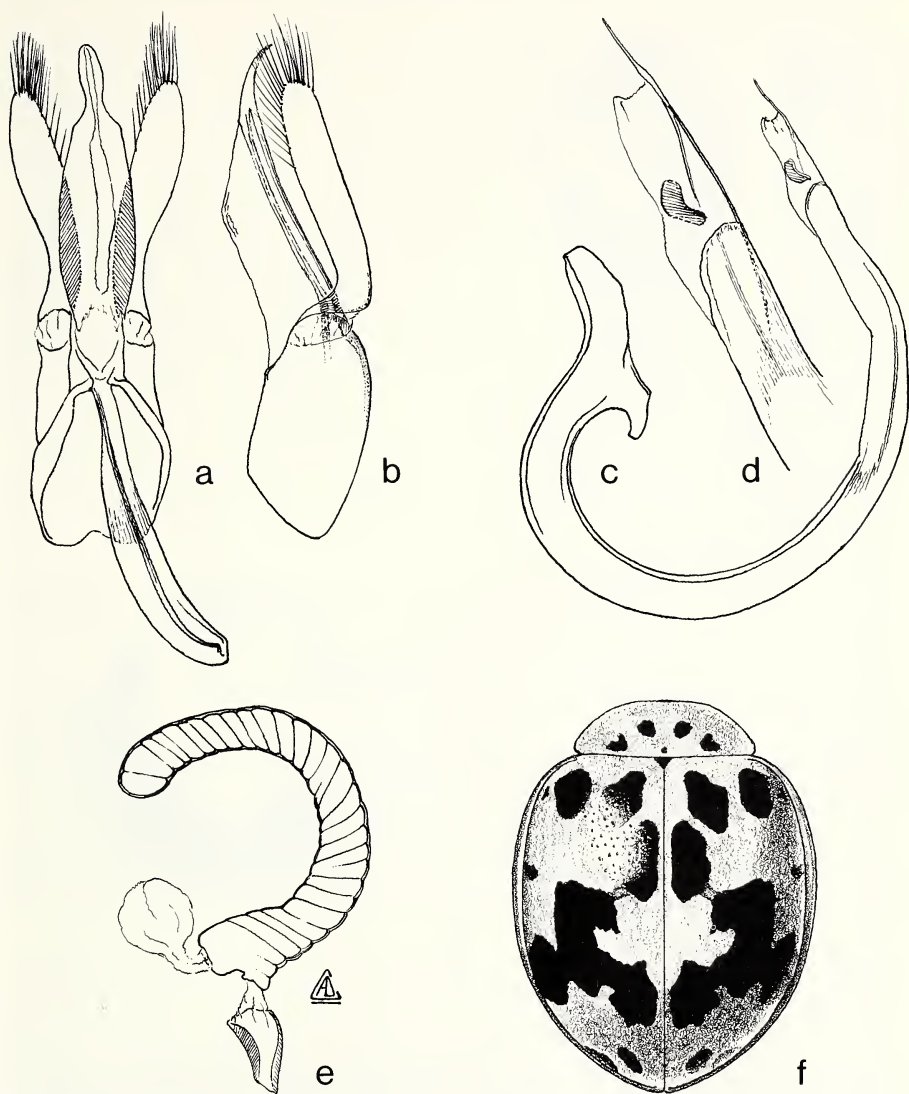


Fig. 693. *Psyllobora borealis*.

Discussion. This species is not at all unlike *P. borealis* in spite of the seemingly obvious dissimilarity in color pattern. There are, however, significant differences in the genitalia of the 2 species. *Psyllobora koebelei* is a junior synonym of *plagiata*. Almost all of the Schaeffer types are now in the USNM, but there are no specimens of *P. plagiata* labeled as type material. However, there are 4 specimens in the USNM

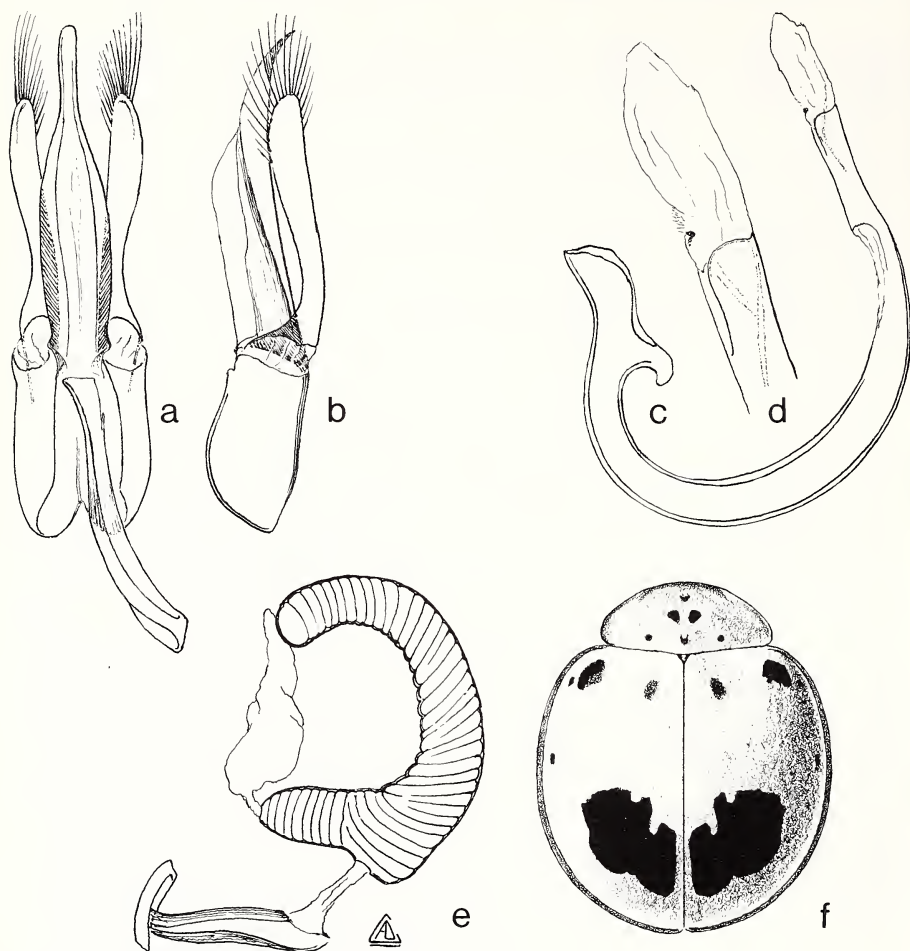


Fig. 694. *Psyllobora plagiata*.

labeled "Brooklyn Museum Coll. 1929" which I believe are part or all of the original series. One of these also bears the label "Huach Mts., Ariz, VII, 9000 ft.". I here designate and label one of these specimens, a male, as the lectotype. The type of *koebelei* is a unique male (holotype). It is labeled "Nogales/St. Cruz Co. VI.02 Ariz/2426/A. Koebele collector/*Psyllobora Koebelei* Nun.".

Type locality. Of *plagiata*, Huachucha Mts., Arizona (lectotype here designated); of *koebelei*, Nogales, Santa Cruz Co., Arizona.

Type depository. Of *plagiata*, USNM; of *koebelei*, CAS.

Distribution. Figure 690. ARIZONA: Huachucha Mts.; Santa Catalina Mts.

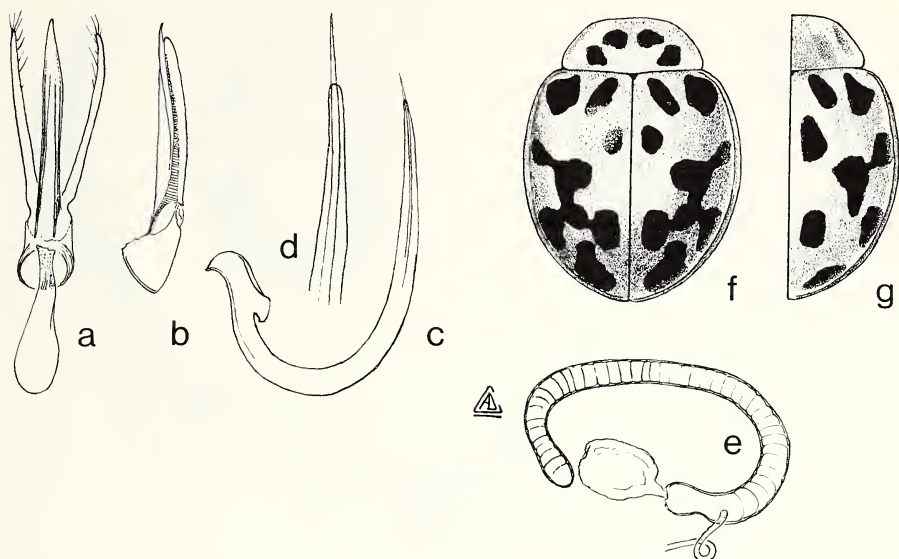


Fig. 695. *Psyllobora parvinotata*.

Psyllobora parvinotata Casey

Fig. 695a-g; Map, Fig. 690

Psyllobora parvinotata Casey, 1899, p. 101.—Blatchley, 1918, p. 420.—Timberlake, 1943, pp. 42, 59.—J. Chapin, 1974, p. 70.

Psyllobora 20-maculata var. *parvinotata*: Leng, 1903b, p. 210.—Casey, 1908, p. 407.—Korschefsky, 1932, p. 569.

Psyllobora pallidicola: Blatchley, 1918, p. 420.

Psyllobora 20-maculata var. *pallidicola* Blatchley, 1914, p. 65.—Blatchley, 1930, p. 38.—Korschefsky, 1932, p. 569.

Diagnosis. Length 2.75 to 3.40 mm, width 1.40 to 1.80 mm. Color pattern as in *P. vigintimaculata* except pronotum often without spots, or spots pale; elytron with spots less confluent and overall appearance paler than *P. vigintimaculata* (Fig. 695f-g). Male genitalia as in Figure 695a-d. Female genitalia as in Figure 695e.

Discussion. Examples of this species that lack pronotal spots or have them strongly reduced are readily distinguished from *P. vigintimaculata* because the latter species almost always has well defined pronotal maculation. Specimens of *P. parvinotata* with maculate pronota are difficult to distinguish and genitalia often must be examined. These 2 species are at least partially allopatric in that I have not seen any specimens of *P. vigintimaculata* from peninsular Florida, and very few from other Gulf Coast localities where *P. parvinotata* occurs. The type of *P. parvinotata* is a unique (holotype) male.

Type locality. Of *parvinotata*, Palm Beach, Florida; of *pallidicola*, Dunedin, Florida.

Type depository. Of *parvinotata* (35546), USNM; of *pallidicola*, PU.

Distribution. Figure 690. Florida to Louisiana.

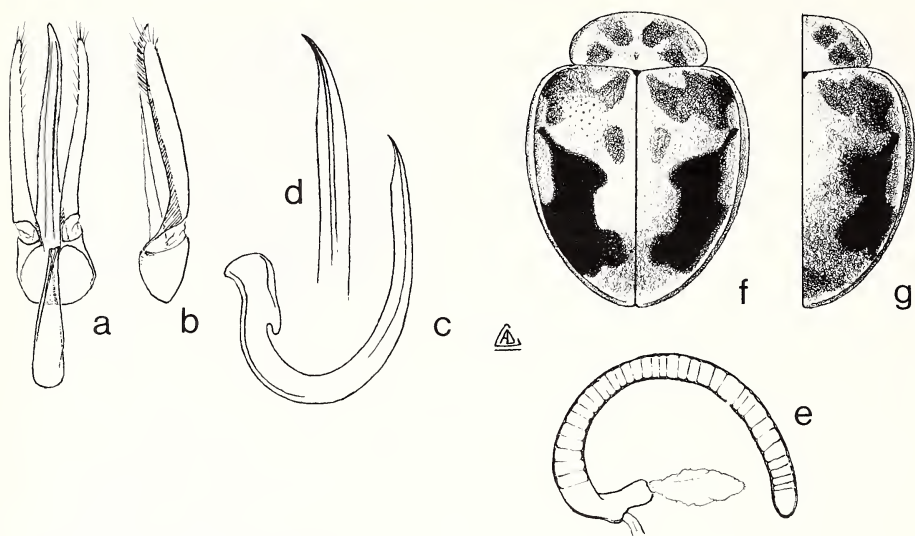


Fig. 696. *Psyllobora renifer*.

Psyllobora renifer Casey

Fig. 696a-g; Map, Fig. 697

Psyllobora renifer Casey, 1899, p. 102.—Leng, 1903b, p. 210.—Casey, 1908, p. 407.—Timberlake, 1943, pp. 42, 59.—J. Chapin, 1974, p. 71.

Psyllobora vigintimaculata ab. *renifer*: Korschefsky, 1932, p. 569.

Psyllobora renifera: Timberlake, 1943, pp. 42, 59.—J. Chapin, 1974, p. 71.

Diagnosis. Length 1.75 to 2.40 mm, width 1.40 to 1.80 mm. Color pattern as described for *P. vigintimaculata* except most elytral spots coalescent, suffused (Fig. 696f, g). Male genitalia as in Figure 696a-d. Female genitalia as in Figure 696e.

Discussion. Most examples of this species are recognized because of the strongly coalescent elytral spots. The range of *P. renifer* is from Louisiana west to southern California and into northern Mexico. The holotype of *renifer* is a unique male.

Type locality. Brownsville, Texas.

Type depository. USNM (35548).

Distribution. Figure 697. Louisiana to Nevada and California.

Subfamily Epilachninae

Epilachninae Ganglbauer, 1899, p. 947.—Leng, 1920, p. 217.—Korschefsky, 1931, p. 16.—Blackwelder, 1945, p. 440.—Wingo, 1952, p. 25.—J. Chapin, 1974, p. 71.—Gordon, 1976a, p. 16.

Epilachniens Mulsant, 1846, p. 190.—Mulsant, 1850, p. 696.

Trischosomides Mulsant, 1850, p. 696 (in part).

Coccinellidae with dorsal surface pubescent. Head retracted under pronotum so hind margin of eye usually covered by pronotum. Eye oblique, finely faceted, inner

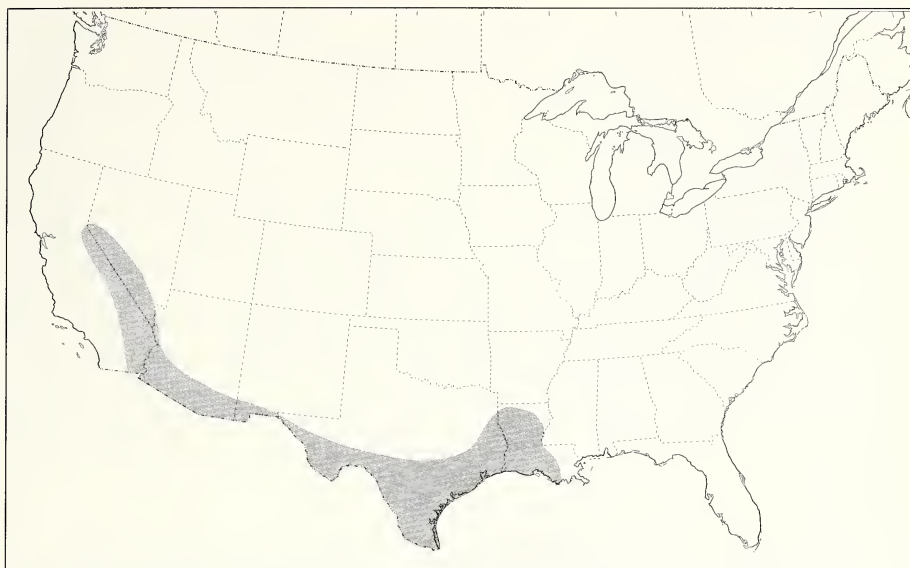


Fig. 697. Distribution. *Psyllobora renifer*.

margin broadly, feebly curved. Labium with palpal insertion median or subterminal. Apical segment of maxillary palpus weakly securiform (Fig. 698b). Mandible without basal tooth but with several teeth of various types in apical half (Fig. 698d). Antenna inserted in depression on inner side of eye, 11-segmented, last 3 segments forming loose club (Fig. 698c), outer margin of club segments appearing slightly serrate. Prosternal process narrow, apex truncate or bluntly rounded. Tarsus cryptotetramerous. Male genitalia symmetrical. Female genital plate short, broad, stylus visible or not (Fig. 703e).

Members of this subfamily occur worldwide, mostly in the tropical regions. There are 2 tribes, Epilachnini and Madaini, represented in the Western Hemisphere, with only the former represented north of Mexico. The feeding habits of the Epilachninae are unusual because most Coccinellidae are predators, but epilachnines are plant feeders. A few species are serious pests of cultivated crops, such as *E. varivestis* Mulsant on beans of various types. The subfamily was revised by Gordon (1976a) for the Western Hemisphere.

Tribe Epilachnini

Epilachnini Costa, 1849, p. 69.—Casey, 1899, p. 102.—Korschefskey, 1931, p. 16.—Gordon, 1976a, p. 17.

Epilachninae with form oval, cordate, or elongate oval, widest anterior to middle of elytra, lateral margin of elytron usually explanate. Leg with tibia slender, nearly as long as femur and trochanter combined, tarsus received in tibial grooves (Fig. 698f); front tibia with one or 2 large, acuminate spurs at apex on inner margin, middle

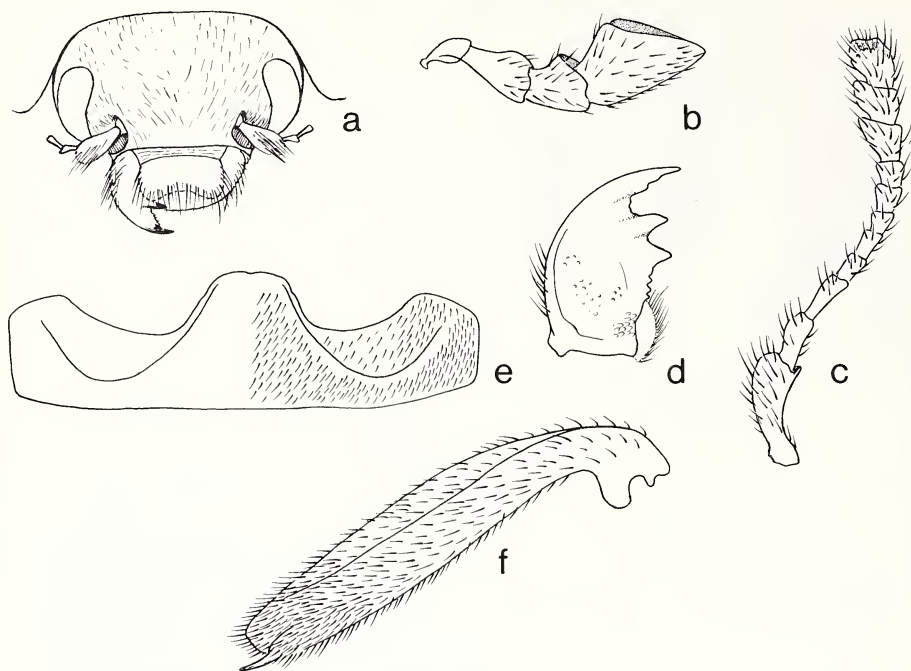


Fig. 698. *Epilachna* sp. a. Head. b. Maxillary palpus. c. Antenna. d. Mandible. e. Postcoxal lines. f. Tibia.

and hind tibia each with 2 acuminate spurs. Epipleuron flat or descending externally with no depressions for reception of leg.

Two genera represent this tribe north of Mexico. One genus, *Epilachna*, is native to the region and the other, *Subcoccinella*, is an introduction from Europe. The complex mandibular structure, which is an adaptation for plant feeding, characterizes members of this tribe. See Gordon (1976a).

KEY TO GENERA OF EPILACHNINI

1. Postcoxal line strongly recurved apically (fig. 698e); length more than 6.0 mm *Epilachna* Dejean
- Postcoxal line not recurved apically (Fig. 705c); length less than 5.0 mm *Subcoccinella* Huber

Genus *Epilachna* Dejean

Epilachna Dejean, 1837, p. 460.—Hope, 1840, p. 157.—Mulsant, 1850, p. 700.—LeConte, 1852, p. 130.—Crotch, 1874b, p. 53.—Casey, 1899, p. 103.—Leng, 1920, p. 217.—Korschefsky, 1931, p. 17.—Blackwelder, 1945, p. 440.—Wingo, 1952, p. 25.—J. Chapin, 1974, p. 72.—Gordon, 1976a, p. 37. Type-species; *Coccinella borealis* (F.), by subsequent designation of Hope, 1840.

Solanophila Weise, 1898a, p. 99.—Korschefsky, 1931, p. 18.—Blackwelder, 1945, p. 440.—Dieke, 1947, p. 7.—Li and Cook, 1961, p. 33. Type-species; *Solanophila gibbosa* Weise, by subsequent designation of Li and Cook, 1961.

Afissa Dieke, 1947, p. 106.—Li and Cook, 1961, p. 33. Type-species; *Coccinella flavicollis* Thunberg, by original designation.

Epilachnini with labrum usually truncate or feebly emarginate, sometimes strongly emarginate, usually concealing at least basal $\frac{1}{3}$ of mandible. Mandible with apex usually trifid, sometimes bifid, apical teeth acuminate, usually with 2 large teeth and several minor teeth or dentules below apex. Apex of anterior tibia with single acuminate spur; apices of middle and hind tibiae each with 2 acuminate spurs. All tibiae grooved for reception of tarsus.

Most species of *Epilachna* are neotropical with 3 species occurring in the United States. Two plant families serve as hosts for the North American species. *Epilachna borealis* and *E. tredecimnotata* feed on members of the Cucurbitaceae, *E. varivestis* feeds on members of the Leguminaceae. See Gordon (1976a).

KEY TO SPECIES OF *Epilachna*

1. Each elytron with 8 dark spots (Fig. 699e); pronotum immaculate . . . *varivestis* Mulsant
- Each elytron with 7 dark spots (Fig. 701f); pronotum usually with 4 dark spots . . . 2
- 2(1). Species occurring from eastern United States to central Texas (Fig. 702) . . . *borealis* (F.)
- Species occurring from West Texas to Arizona and south (Fig. 704) *tredecimnotata* (Latreille)

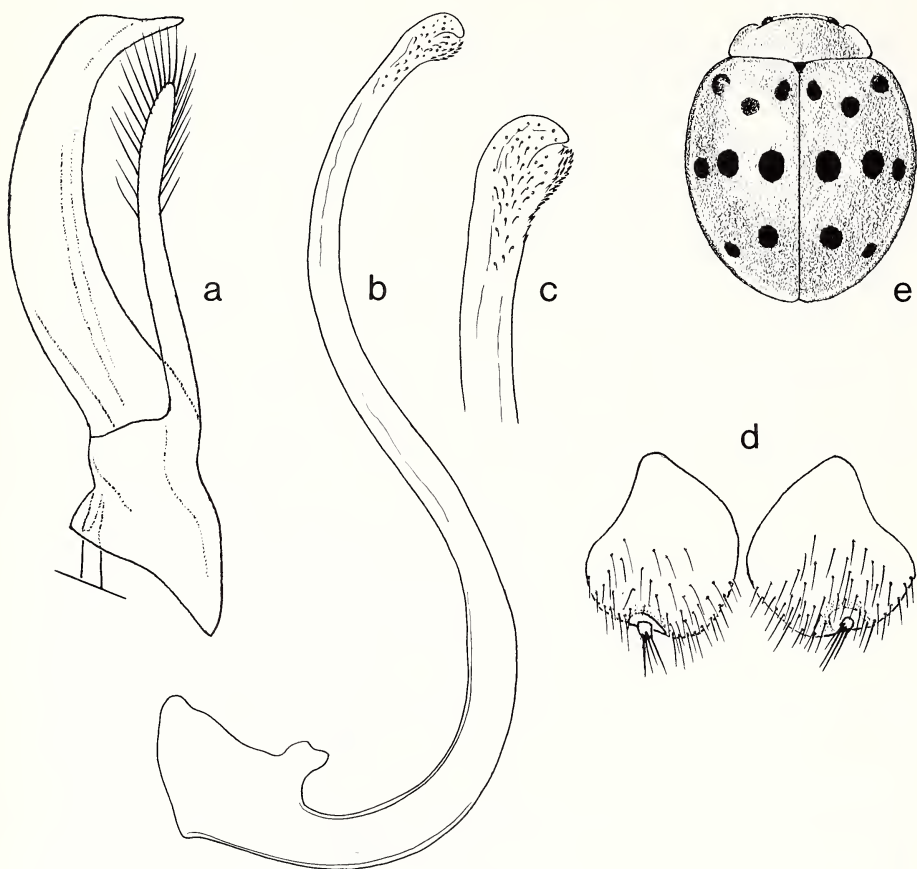


Fig. 699. *Epilachna varivestis*.

Epilachna varivestis Mulsant

Fig. 699a-e; Map, Fig. 700

Epilachna varivestis Mulsant, 1850, p. 815.—Crotch, 1874b, p. 62.—Casey, 1899, p. 103.—Leng, 1920, p. 217.—Korschefsky, 1931, p. 58.—Wingo, 1952, p. 47.—J. Chapin, 1974, p. 73.

Epilachna corrupta Mulsant, 1850, p. 815.—Casey, 1899, p. 103.—Korschefsky, 1931, p. 58.

Epilachna varivestis var. *cervina* Mulsant, 1850, p. 817.

Epilachna varivestis var. *genuina* Mulsant, 1850, p. 817.

Epilachna corrupta ab. *cervina*: Korschefsky, 1931, p. 58.

Epilachna corrupta ab. *genuina*: Korschefsky, 1931, p. 58.

Epilachna cervina: Blackwelder, 1945, p. 442.

Epilachna maculiventris Bland, 1864, p. 256.—Crotch, 1874, p. 64 (as a synonym of *borealis* F.).—Korschefsky, 1931, p. 38 (as a synonym of *corrupta* Mulsant).—Blackwelder, 1945, p. 442.

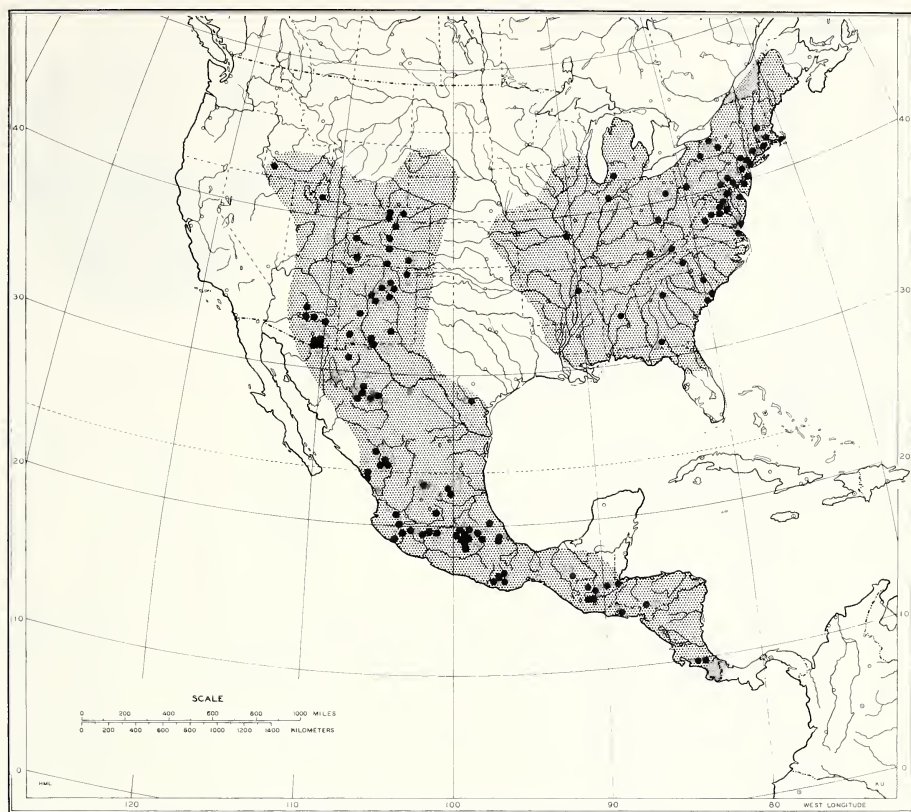


Fig. 700. Distribution. *Epilachna varivestis*.

Epilachna cuprea Cockerell, 1918, p. 153.—Blackwelder, 1945, p. 442.

Epilachna toweri Johnson, 1910, p. 78.—Leng, 1920, p. 217.

Epilachna juncta Johnson, 1910, p. 79.—Blackwelder, 1945, p. 442.

Epilachna corrupta ab. *cuprea*: Korschefsky, 1931, p. 58.

Epilachna corrupta ab. *juncta*: Korschefsky, 1931, p. 58.

Diagnosis. Length 6.43 to 8.10 mm, width 4.85 to 6.38 mm. Color brownish yellow; metasternum and median area of abdominal sterna slightly darker; elytron with 8 dark brown spots arranged in transverse rows (Fig. 699e), but pattern variable. Male genitalia as in Figure 699a–c. Female genitalia as in Figure 699d.

Discussion. See Gordon (1976a) for detailed discussion.

Type locality. Mexico.

Type depository. UCCC.

Distribution. Figure 700. Eastern distribution; Maine to Florida, west to Nebraska and Louisiana. Western Distribution; South Dakota and Idaho south to west Texas and Arizona.

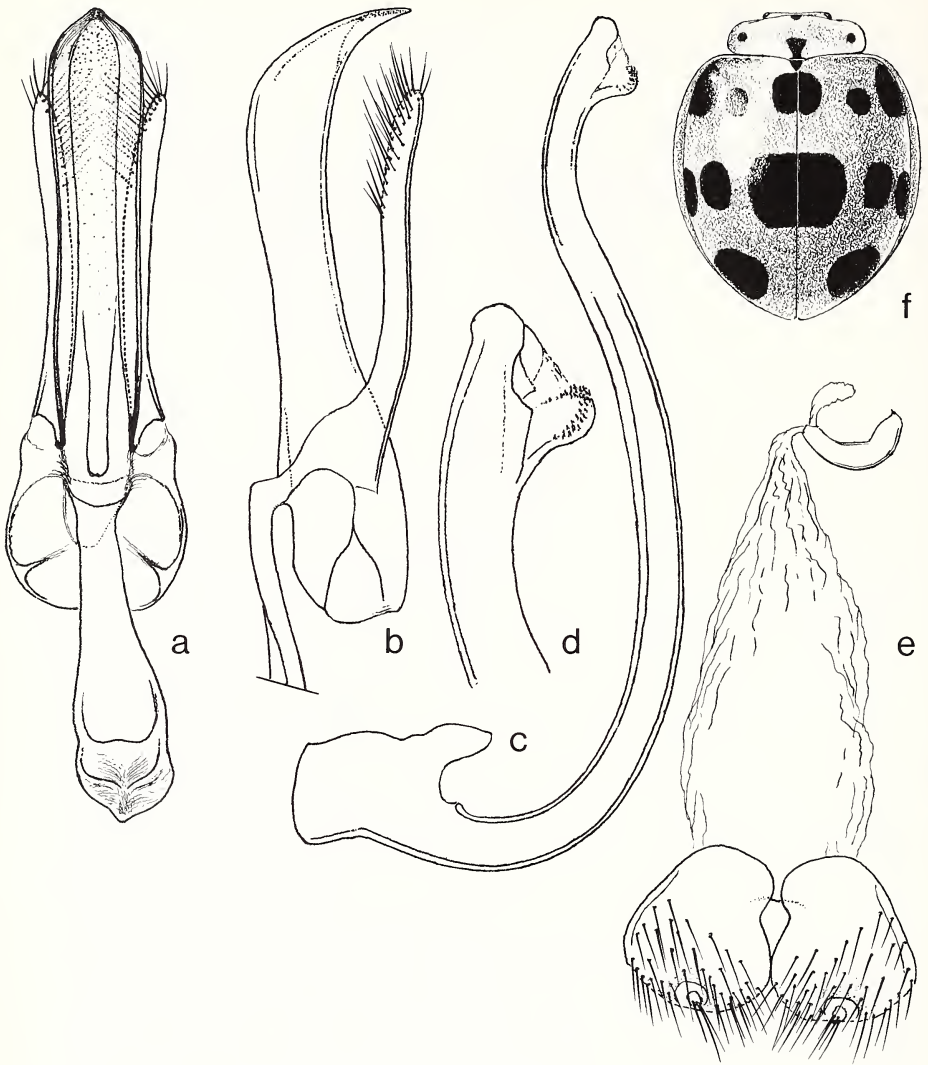


Fig. 701. *Epilachna borealis*.

Epilachna borealis (F.)

Fig. 701a-f; Map, Fig. 702

Coccinella borealis Fabricius, 1775, p. 82.

Coccinella punctatissima Weber, 1801, p. 48.

Epilachna borealis: Hope, 1840, p. 157.—Mulsant, 1850, p. 826 (in part).—Crotch, 1874b, p. 64.—Weise, 1898a, p. 98.—Casey, 1899, p. 103.—Leng, 1920, p. 217.—Korschevsky, 1931, p. 55.—Wingo, 1952, p. 47.—J. Chapin, 1974, p. 72.—Gordon, 1976a, p. 133.

Epilachna borealis ab. *punctatissima*: Korschevsky, 1931, p. 56.

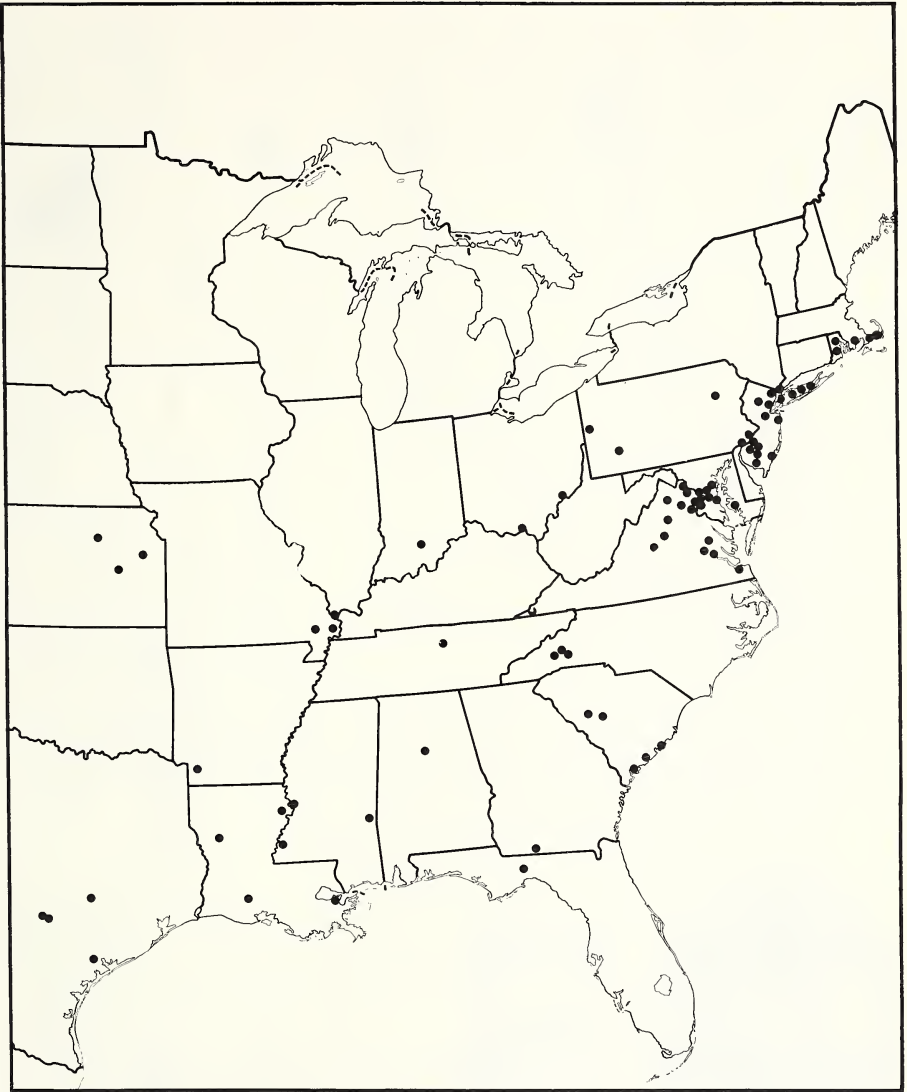


Fig. 702. Distribution. *Epilachna borealis*.

Diagnosis. Length 7.35 to 9.80 mm, width 5.50 to 7.63 mm. Color yellow; pronotum with 4 black spots; elytron with 7 large, dark brown spots (Fig. 701f). Male genitalia as in Figure 701a–d. Female genitalia as in Figure 701e.

Discussion. As discussed by Gordon (1976a), this species and *E. tredecimnotata* are very similar in appearance. The elytral spots on the disc are always confluent in *E. borealis*, rarely so in *E. tredecimnotata*, and the male genitalia are different in these 2 species.

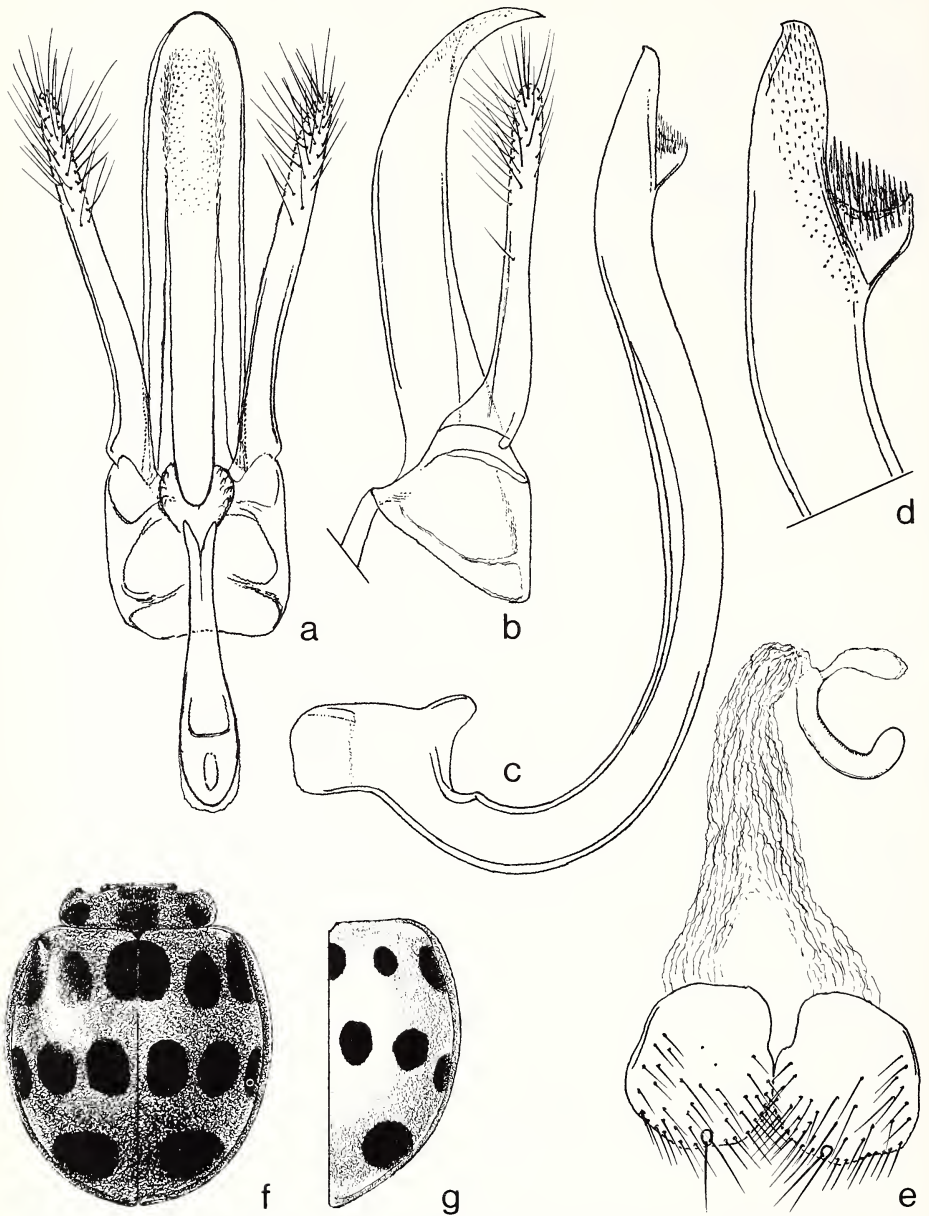


Fig. 703. *Epilachna tredecimnotata*.

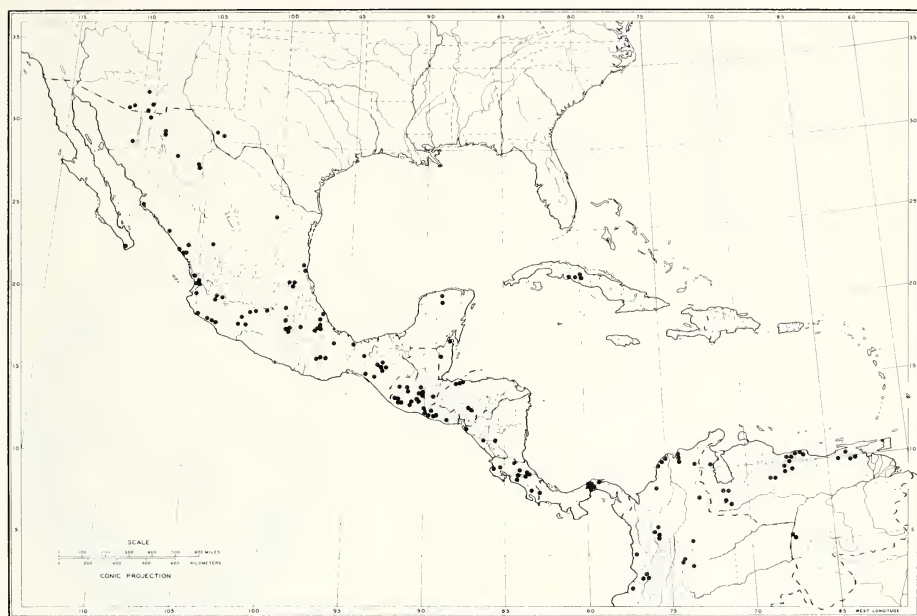


Fig. 704. Distribution. *Epilachna tredecimnotata*.

Type locality. North America, probably Jamaica, Long Island.

Type depository. Fabrician collection, Kiel (not examined).

Distribution. Figure 702. Massachusetts to Florida, west to Kansas and east Texas.

Epilachna tredecimnotata (Latreille)

Fig. 703a–g; Map, Fig. 704

Coccinella tredecimnotata Latreille, 1833, p. 67.

Epilachna borealis ab. *13-notata*: Mulsant, 1850, p. 827.

Epilachna borealis ab. *tredecimnotata*: Korschefsky, 1931, p. 56.—Blackwelder, 1945, p. 441 (for detailed synonymy see Gordon, 1976a, p. 135).

Diagnosis. Length 6.75 to 10.0 mm, width 5.10 to 8.05 mm. Description as for *E. borealis* except elytron with spots usually smaller and sutural spot on disc of elytron separated from suture (Fig. 703f, g); pronotum often with less than 4 spots or with none. Male genitalia as in Figure 703a–d. Female genitalia as in Figure 703e.

Discussion. For further discussion see under *E. borealis* and Gordon (1976a).

Type locality. “America equinox”.

Type depository. DLM.

Distribution. Figure 704. West Texas to Arizona.

Genus *Subcoccinella* Huber

Subcoccinella Huber, 1842, p. 376.—Crotch, 1874b, p. 90.—Korschefsky, 1931, p. 68. Type-species; *Coccinella vigintiquatuorpunktata* L., by monotypy (for detailed synonymy, see Korschefsky, 1931, p. 69).

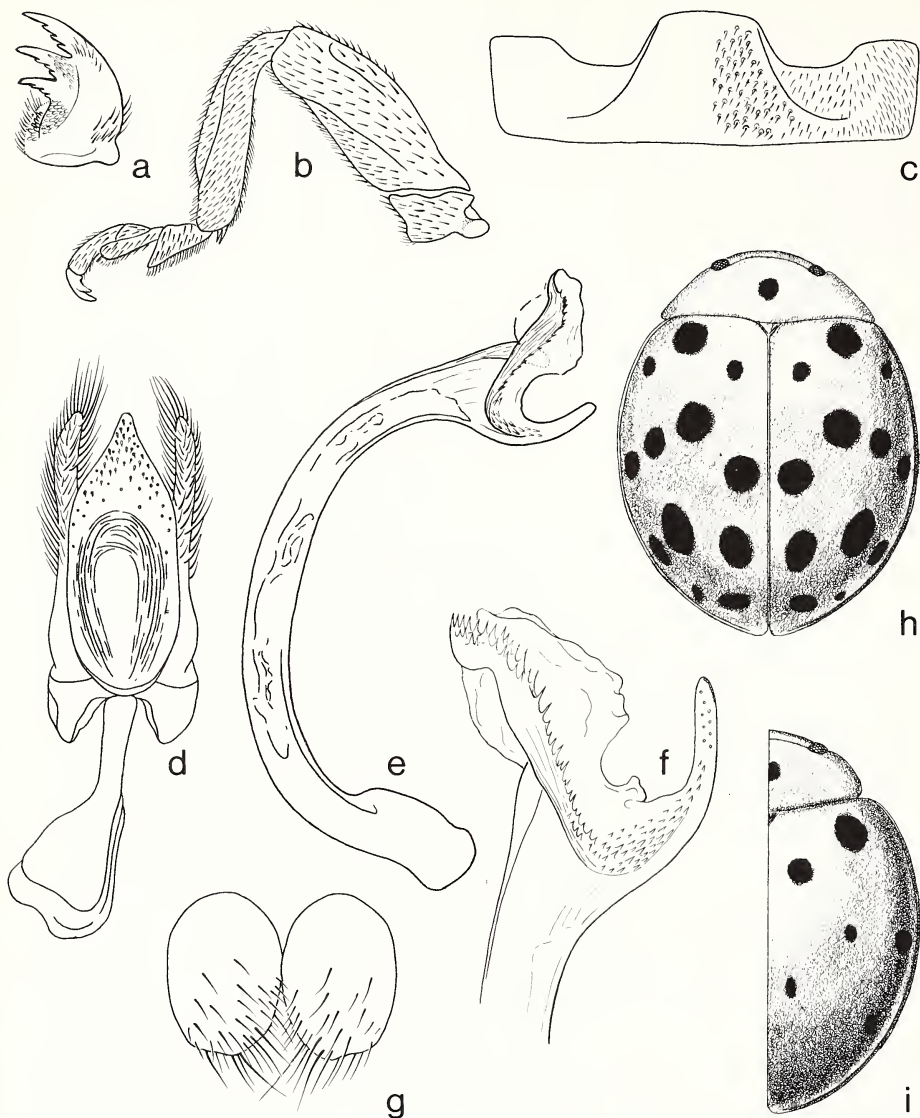


Fig. 705. *Subcoccinella vigintiquatuorpunctata*.

Epilachnini with form oval, lateral margin of elytron feebly explanate. Labrum broadly, feebly emarginate. Mandible with 2 strong apical teeth and 2 strong subapical teeth, each having multiple denticles (Fig. 705a). Anterior tibia with 2 acuminate spurs at apex, laterally flattened with outer margin angulate at apical $\frac{1}{4}$ (Fig. 705b); middle and hind tibiae with 2 apical spurs, slender, not angulate (Fig. 705b). Postcoxal line incomplete, not recurved apically (Fig. 705c).

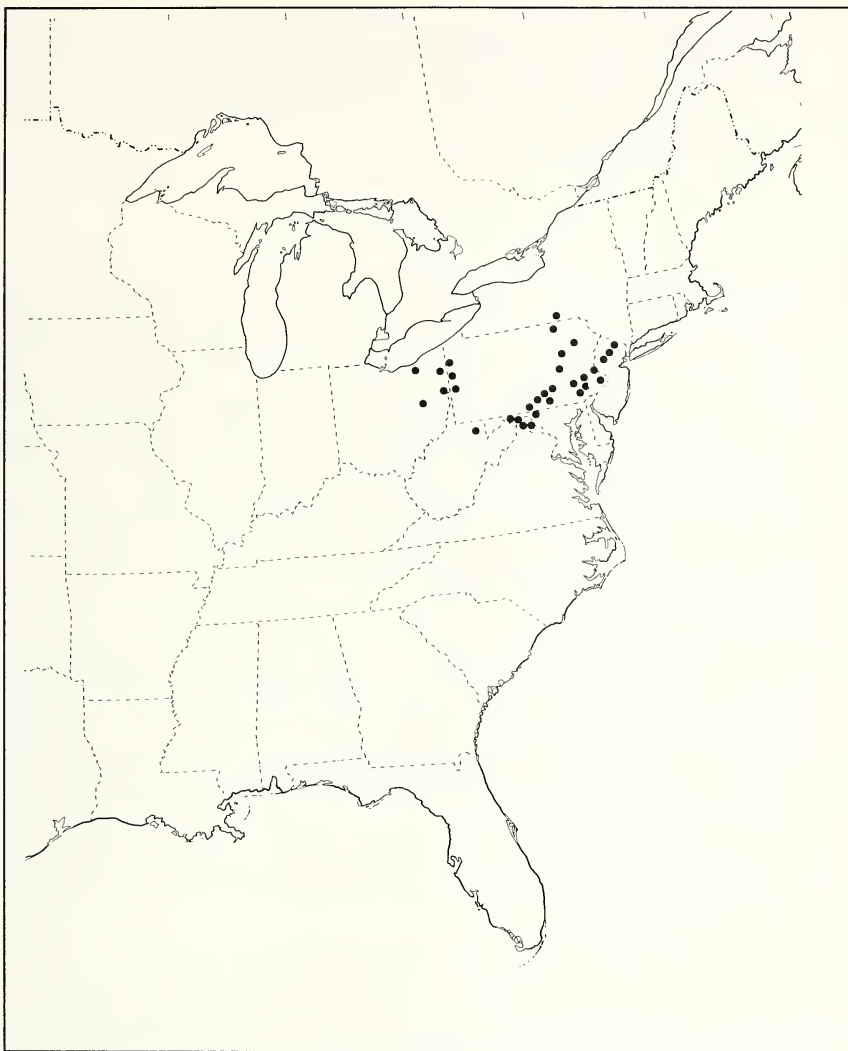


Fig. 706. Distribution. *Subcoccinella vigintiquatuorpunctata*.

This is a monobasic European genus which has accidentally been introduced into North America. It was first reported in 1974 from specimens collected near Hackensack, Bergen Co., New Jersey, in 1973, but has obviously been long established because subsequent collecting has shown it to be widely distributed. In Europe *S. vigintiquatuorpunctata* is a major pest on alfalfa, but so far it has shown no inclination to feed on alfalfa in North America. The principal host in North America is "bouncing bet", *Saponaria officinalis* L., also a European import widely distributed along railroad tracks and highways. In Europe it has been recorded on 70 species of plants in

12 families and can live on several species of legumes, particularly clover. Nearly all previous information on this species in the United States is to be found in various volumes and numbers of the "Cooperative Plant Pest Report (USDA)" from 1974 to April, 1976. I incorrectly placed this genus in the tribe Madaini (Gordon 1976a, p. 206). I here place it in the tribe Epilachnini.

Subcoccinella vigintiquatuorpunctata (L.)

Fig. 705a-i; Map, Fig. 706

Coccinella 24-punctata L., 1758, 366.

Subcoccinella vigintiquatuorpunctata: Huber, 1842, p. 476.—Crotch, 1874b, p. 90.—USDA, 1974, p. 731.—USDA, 1975, p. 184.—Gordon, 1976a, p. 206.—Wheeler and Henry, 1981, p. 197 (for detailed synonymy see Korschefsky, 1931, p. 69).

Diagnosis. Length 3.50 to 4.40 mm, width 2.85 to 3.15 mm. Color yellowish red; elytron with varying number of black spots (Fig. 705h, i). Male genitalia as in Figure 705d, e. Female genital plate as in Figure 705g.

Discussion. This species is easily recognized on appearance alone in the depauperate epilachnine fauna of North America. The dorsal color pattern is variable but the small size and oval form distinguish it from *Epilachna varivestis* and *E. borealis* which occur in the same geographic region.

Type locality. Europe.

Type depository.—Type not examined.

Distribution. Figure 706. ILLINOIS: "East of St. Louis, Mo." MARYLAND: Allhegny Co.; Washington Co. NEW JERSEY: Hunterdon Co.; Morris Co.; Passaic Co. NEW YORK: Tioga Co. OHIO: Columbiana Co.; Coshocton Co.; Cuyahoga Co.; Trumbull Co., Custer, Kelly. PENNSYLVANIA: Beaver Co.; Berks Co.; Bradford Co.; Bucks Co.; Chester Co., Malvern; Cumberland Co.; Dauphin Co., Harrisburg; Franklin Co.; Lackawanna Co.; Lancaster Co.; Lawrence Co.; Lebanon Co.; Lehigh Co., Allentown; Luzerne Co.; Mercer Co.; Montgomery Co.; Northampton Co., Easton; Schuylkill Co. WEST VIRGINIA: Berkeley Co.; Jefferson Co.; Morgan Co.; Paoli; Taylor Co., Grafton.

LITERATURE CITED

- Agassiz, J. L. R. 1846. Nomenclator Zoologicus Index Universalis. Soloduri, 399 pp.
Amman, Gene D. 1961. Predator introductions for control of the balsam woolly aphid on Mt. Mitchell, North Carolina. United States Forest Serv. Southeast. Forest Expt. Sta. Res. Notes 153, 2 pp.
Amman, Gene D. 1966. *Aphidecta oblitterata* (Coleoptera: Coccinellidae), an introduced predator of the balsam woolly aphid, *Chermes piceae* (Homoptera: Chermidae), established in North Carolina. Jour. Econ. Entomol. 59:506-508.
Amman, Gene D. and C. F. Speers. 1964. Release of predators of the balsam woolly aphid in North Carolina. United States Forest Serv. Southeast. Forest Expt. Sta. Res. Notes 153, 4 pp.
Angelet, G. W. and R. L. Jacques. 1975. The establishment of *Coccinella septempunctata* L. in the Continental United States. United States Dept. Agr. Coop. Econ. Insect Rep. 25: 883-884.

- Angelet, G. W., J. M. Tropp and A. N. Eggert. 1979. *Coccinella septempunctata* in the United States: recolonizations and notes on its ecology. *Envir. Entomol.* 8:896-901.
- Arnett, R. H., Jr. 1968. The Beetles of the United States. (A Manual for Identification.) The American Entomol. Inst., Ann Arbor, Michigan, 1112 pp.
- Ashmead, W. H. 1880. Orange Insects: A Treatise on the Injurious and Beneficial Insects Found on Orange Trees in Florida. Jacksonville, Florida, 78 pp.
- Balduf, W. V. 1935. The Bionomics of Entomophagous Coleoptera. Chicago, New York, 220 pp.
- Barovskiy, V. 1922. Revisio specierum palaearcticarum Coccinellidarum generis *Exochomus* Redtb. *Ann. Mus. Zool. Russie.* 23:289-303.
- Bartlett, K. A. 1939. The collection in Trinidad and southern Brazil of coccinellids predatory on scales. *Proc. 6th Pacific Sci. Cong.* 4:339-343.
- Bay, E. C. 1970. Colonization of beneficial organisms in California, 1970. *Div. Biol. Cont., Dept. Entomol., Univ. Calif., Riverside* (unpubl. report).
- Bay, E. C. 1971. Colonization of beneficial organisms in California, 1971. *Div. Biol. Cont., Dept. Entomol., Univ. Calif., Riverside* (unpubl. report).
- Belicek, J. 1976. Coccinellidae of western Canada and Alaska with analyses of the transmontane zoogeographic relationships between the fauna of British Columbia and Alberta (Insecta: Coleoptera; Coccinellidae). *Quaest. Entomol.* 12:283-409.
- Berg, F. G. C. 1874. Noticias criticas sobre algunas publicaciones entomologicas. *Bol. Acad. Nac. Cienc. Cordova* 1:274-293.
- Bielawski, R. 1958. A revision of the genus *Anisosticta* Duponch., with a description of a new species from Siberia (Coleoptera: Coccinellidae). *Ann. Mus. Zool. Warszawa* 17:91-112.
- Bielawski, R. 1959. Keys for the identification of the Polish Insects. *Pol. Zwiast. Entomol. Klucze Oznaczania Owadow Poland* 19:3-92.
- Billberg, G. J. 1920. *Enumeratio Insectorum in Museo Gust. Joh. Billberg.* Stockholm, 138 pp.
- Blackburn, T. 1889. Further notes on Australian Coleoptera, with descriptions of new species. *Trans. Roy. Soc. South Australia* 11:175-214.
- Blackburn, T. 1892. Further notes on Australian Coleoptera, with descriptions of new genera and species. *Trans. Roy. Soc. South Australia* 15:207-261.
- Blackwelder, R. E. 1945. Checklist of the coleopterous insects of Mexico, Central America, the West Indies, and South America. Part 3. *United States Nat. Mus. Bull.* 185:343-550.
- Blaisdell, F. E. 1892. A new species of Coleoptera from California. *Entomol. News* 3:51.
- Blanchard, E. 1845. *Histoire des Insectes, Traitant de Leurs Moeurs et du Leurs Métamorphoses en Général, et Comprenant une Nouvelle Classification Fondée sur Leurs Rapports Naturelles.* Paris, 2 vols., pp. 1-398, 1-524.
- Bland, J. H. B. 1864. Descriptions of several new species of North American Coleoptera. *Proc. Entomol. Soc. Philadelphia* 3:65-72.
- Blatchley, W. S. 1910. An illustrated catalogue of the Coleoptera or beetles (exclusive of the Rhyncophora) known to occur in Indiana. *Bull. Indiana Dep. Geol. Res.* 1:1-1386.
- Blatchley, W. S. 1914. Notes on the winter and early spring Coleoptera of Florida, with descriptions of new species. *Canadian Entomol.* 46:61-66.
- Blatchley, W. S. 1916. A new genus and species of Nitidulini, with descriptions of other new species of Coleoptera from Indiana and Florida. *Canadian Entomol.* 48:91-96.
- Blatchley, W. S. 1917. On some new or noteworthy Coleoptera from the west coast of Florida. *Canadian Entomol.* 49:137-143.
- Blatchley, W. S. 1918. Some new or scarce Coleoptera from western and southern Florida. *Canadian Entomol.* 50:416-424.

- Blatchley, W. S. 1920. Notes on winter Coleoptera of western and southern Florida, with descriptions of new species. *Canadian Entomol.* 52:42-46.
- Blatchley, W. S. 1923. Notes on the Coleoptera of southern Florida with descriptions of new species. *Canadian Entomol.* 55:13-20.
- Blatchley, W. S. 1924. New Coleoptera from southern Florida with notes on other interesting species. *Canadian Entomol.* 56:164-170.
- Blatchley, W. S. 1927. Some new species of Coleoptera from Indiana and Florida. *Entomol. News* 38:139-144.
- Blatchley, W. S. 1928. Notes on some Florida Coleoptera with descriptions of new species. *Canadian Entomol.* 60:60-73.
- Blatchley, W. S. 1930a. Notes on the distribution of Coleoptera in Florida with new additions to the known fauna of that state. *Canadian Entomol.* 62:28-35.
- Blatchley, W. S. 1930b. Blatchleyana. A List of the Published Writings of W. S. Blatchley, A.B., A. M., LL.D of Indianapolis, Indiana and Dunedin, Florida. Indianapolis, 77 pp.
- Boheman, C. H. 1859. Coleoptera. Species nova descripsit. In *Kongliga Svenska Fregatten Eugénies Resa Omkring Jorden under Befall of C. A. Virgin, 1851-1853, Zoologi, I, Insecta*, pp. 113-218.
- Boisduval, J. B. A. 1835. Voyage de Découvertes de l'*Astrolabe*. Exécuté par Ordre du Roi, Pendant les Années 1826-1827-1828-1829, sous le Commandement de M. J. Dumont D'Urville. Faune Entomologique de l'Océan Pacifique, avec l'Illustration des Insectes Nouveaux Recueillis Pendant le Voyage, Deuxième Partie, Coléoptères et Autres Ordres. Paris, 716 pp.
- Bouillon, J. B. 1858. Un numero de la faune entomologique Belge. Coccinelles des auteurs. *Ann. de la Soc. Entomol. Belgique* 2:1-28.
- Bowditch, F. C. 1902. Notes on Casey's revision of the American Coccinellidae. *Entomol. News* 13:205-207.
- Brethes, J. 1905. Descripción de un género y de una nueva especie de clavicornio de Buenos Aires (Coléoptero). *Anal. Soc. Cient. Argentina* 59:76-79.
- Brethes, J. 1925. Sur une collection de Coccinellides (et un Phalacridae) du British Muséum. *Anal. Mus. Nac. Hist. Nat. Buenos Aires* 33:145-175.
- Britton, W. E. 1915. Miscellaneous Insect Notes. In Fourteenth Report of the State Entomologist of Connecticut for the Year 1914, Being the Part III of the Annual Report of 1914. New Haven, Connecticut, pp. 1-198.
- Brown, W. J. 1940. Notes on the American distribution of some species of Coleoptera common to the European and North American continents. *Canadian Entomol.* 72:65-78.
- Brown, W. J. 1950. The extralimital distribution of some species of Coleoptera. *Canadian Entomol.* 82:200.
- Brown, W. J. 1962. A revision of the forms of *Coccinella* L., occurring in America north of Mexico (Coleoptera: Coccinellidae). *Canadian Entomol.* 94:785-808.
- Brown, W. J. 1967. The Mexican forms of *Coccinella* (Coleoptera: Coccinellidae). *Canadian Entomol.* 99:107-108.
- Brown, W. J. and R. de Ruette. 1962. An annotated list of the Hippodamiini of Northern America, with a key to the genera (Coleoptera: Coccinellidae). *Canadian Entomol.* 94: 643-652.
- Canada Dept. of Agr. 1938. Summary of insect parasites and predators liberated in Canada up to December 31, 1937. *Canadian Insect Pest Rev.* 16:77-154.
- Capra, F. 1927. Aggiunte e corezzioni al catalogo Coleopterorum regionis Palearcticae. *Boll. Soc. Entomol. Italiana* 59:152-160.
- Cartwright, B. O., R. D. Eikenbary, G. W. Angalet, and R. K. Campbell. 1979. Release and establishment of *Coccinella septempunctata* in Oklahoma. *Env. Ent.* 8:819-823.
- Casey, T. L. 1899. A revision of the American Coccinellidae. *Jour. New York Entomol. Soc.* 7:71-169.

- Casey, T. L. 1905. A new *Carabus* and *Cychrus*, with miscellaneous notes on Coleoptera. Canadian Entomol. 37:160–164.
- Casey, T. L. 1908. Notes on the Coccinellidae, Canadian Entomol. 40:393–421.
- Casey, T. L. 1910. Synonymical and other notes on Coleoptera. Canadian Entomol. 42:105–114.
- Casey, T. L. 1911. Notes on the Coccinellidae with some general remarks and synonymy. Mem. Coleoptera 2:246–254. Lancaster, Pennsylvania.
- Casey, T. L. 1924. Additions to the known Coleoptera of North America. Mem. Coleoptera, 11:1–347. Lancaster, Pennsylvania.
- Champion, G. C. 1913. Notes on various Central American Coleoptera, with descriptions of new genera and species. Trans. Entomol. Soc. London 1913:58–169.
- Chant, D. A. 1964. Colonization of beneficial organisms in California, 1964. Dept. Biol. Cont., Univ. Calif., Riverside (unpubl. report).
- Chant, D. A. 1965. Colonization of beneficial organisms in California, 1965. Dept. Biol. Cont., Univ. Calif., Riverside (unpubl. report).
- Chant, D. A. 1966. Colonization of beneficial organisms in California, 1966. Dept. Biol. Cont., Univ. Calif., Riverside (unpubl. report).
- Chantal, C. 1972. Additions à la faune Coléoptérique du Québec. Nat. Can. 99:243–244.
- Chapin, E. A. 1930. New Coccinellidae from the West Indies. Jour. Washington Acad. Sci. 20:488–495.
- Chapin, E. A. 1933. A new genus of West Indian Coccinellidae (Coleoptera). Proc. Biol. Soc. Washington 46:95–99.
- Chapin, E. A. 1940. New genera and species of lady-beetles related to *Serangium* Blackburn (Coleoptera: Coccinellidae). Jour. Washington Acad. Sci. 30:263–272.
- Chapin, E. A. 1946. Review of the New World species of *Hippodamia* Dejean (Coleoptera: Coccinellidae). Smithsonian Misc. Coll. 106:1–39.
- Chapin, E. A. 1949. New beetle records for Florida. Coleopterists Bull. 3:23.
- Chapin, E. A. 1955. On some Coccinellidae (Coleoptera) from Newfoundland and Nova Scotia. Psyche 62:152–156.
- Chapin, E. A. 1957. Records of coccinellid beetles from the Cayman Islands, with descriptions of new species from the West Indies. Entomol. Month. Mag. 93:89–91.
- Chapin, E. A. 1964. Las especies Colombianas de *Cryptognatha* Mulsant (Coleoptera: Coccinellidae). Rev. Acad. Colombiana Cien. 12:231–234.
- Chapin, E. A. 1965a. The genera of the Chilacorini (Coleoptera: Coccinellidae). Bull. Mus. Comp. Zool. Harvard Univ. 133:227–271.
- Chapin, E. A. 1965b. In Insects of Micronesia. Coleoptera, Coccinellidae. Bernice P. Bishop Museum, Honolulu, Hawaii 16:189–254.
- Chapin, E. A. 1966. A new species of myrmecophilous Coccinellidae with notes on other Hyperaspini (Coleoptera). Psyche 73:278–283.
- Chapin, J. B. 1973. New species of ladybeetles in the genera *Scymnus* and *Mulsantina* (Coleoptera: Coccinellidae). Ann. Entomol. Soc. America 66:1071–1073.
- Chapin, J. B. 1974. The Coccinellidae of Louisiana (Insecta: Coleoptera). Louisiana St. Univ. Exp. Sta. Bull. No. 682:1–87.
- Chapuis, F. 1876. Histoire naturelle des insectes. Genera des Coléoptères, Paris, 12:1–424.
- Chazeau, J. 1981. Données sur la biologie de *Coelophora quadrivittata* (Col.: Coccinellidae) prédateur de *Coccus viridis* (Hom.: Coccidae) en Nouvelle-Calédonie. Entomophaga 26: 301–312.
- Chevrolat, L. A. 1837. In Dejean, P. F., Catalogue des Coléoptères de la Collection de M. le Comte Dejean, ed. 3. Paris, pp. 385–503.
- Chevrolat, L. A. 1842. In d'Orbigny, Dictionnaire Universel d'Histoire Naturelle. Vol. 2. Paris, 796 pp.
- Chevrolat, L. A. 1849. Pp. 1–796 = 1842.

- Chittenden, F. H. 1906. The melon aphid (*Aphis gossypii* Glov.). U.S. Dept. Agr. Circ. 80:1-16.
- Chittenden, F. H. and H. O. Marsh. 1920. The bean ladybird. United States Dept. Agr. Bull. 843:1-24.
- CIBC. 1971. Biological Control programmes against insects and weeds in Canada 1959-1968. Tech. Comm. No. 4 Common Inst. Biol. Contr. Trinidad, 266 pp.
- Clark, R. C. and N. R. Brown. 1961. Studies of predators of the balsam woolly aphid *Adelges piceae* (Ratz.) (Homoptera: Adelgidae) IX. *Pullus impexus* (Muls.) (Coleoptera: Coccinellidae), an introduced predator in eastern Canada. Canadian Entomol. 93:1162-1168.
- Clausen, C. P. 1940. Entomophagous insects. London, New York, 688 pp.
- Clausen, C. P. 1955. Release of recently imported parasites and predators in California, 1952-53. Pan-Pacific Entomol. 31:90-92.
- Clausen, C. P. 1956a. Releases of recently imported insect parasites and predators in California, 1954-1955. Pan-Pacific Entomol. 32:125-126.
- Clausen, C. P. 1956b. Biological control of insect pests in the continental United States. United States Dept. Agr. Tech. Bull. 1139:1-151.
- Clausen, C. P. 1957. Colonization of parasites, predators, and weed insects in California during 1957. Dept. Biol. Cont., Univ. California, Riverside (unpubl. report).
- Clausen, C. P. 1959. Releases of recently imported insect parasites and predators in California, 1956-1957. Pan-Pacific Entomol. 35:107-108.
- Clausen, C. P. et al. 1978. Introduced parasites and predators of arthropod pests and weeds: a world review. United States Dept. Agr. Handb. 480, 545 pp.
- Cochereau, P. 1969. Controle biologique d'*Aspidiotus destructor* Signoret (Homoptera, Diaspinae) dans l'île Vaté (Nouvelles Hébrides) au moyen de *Rhizobius pulchellus* Montrouzier (Coleoptera, Coccinellidae). ORSTOM, Ser. Biol. 8:57-100.
- Cockerell, T. D. A. 1900. *Epismilia*. Sci. Gossip 1900:606.
- Cockerell, T. D. A. 1903. The coccinellid genus *Smilia*, Weise. Canadian Entomol. 35:38.
- Costa, A. 1849. Fauna dell regne di Napoli, Coleotteri. Fasc. 65. Napoli, 112 pp.
- Costa Lima, A. 1941. Sôbre a "joaninha" "*Coccidophilus citricola*" Brêthes, 1905 (Coleoptera: Coccinellidae). Rev. Brasileira Biol. 1:49-414.
- Cowan, F. 1865. Curious Facts in the History of Insects; Including Spiders and Scorpions. Philadelphia, 145 pp.
- Cressman, A. W. 1933. Biology and control of *Chrysomphalus dictyospermi* (Morg.). Jour. Econ. Entomol. 26:696-706.
- Crotch, G. R. 1871. List of Coccinellidae. Cambridge, 8 pp.
- Crotch, G. R. 1873. Revision of the Coccinellidae of the United States. Trans. American Entomol. Soc. 4:363-382.
- Crotch, G. R. 1874a. Descriptions of new species of Coleoptera from the Pacific Coast of the United States. Trans. American Entomol. Soc. 5:73-80.
- Crotch, G. R. 1874b. A Revision of the Coleopterous Family Coccinellidae. London, 311 pp.
- Curtis, J. 1827. British Entomology. Vol. 4. London, Plates 147-194.
- Davidson, W. M. 1921. Observations on *Psyllobora taedata* LeConte, a coccinellid attacking mildews. Entomol. News 32:83-89.
- Davidson, W. M. 1923. Biology of *Scymnus nubes* Casey (Coleoptera: Coccinellidae). Trans. American Entomol. Soc. 49:155-163.
- Davis, W. T. 1932. A coccinellid beetle new to the fauna of New York State. Bull. Brooklyn Entomol. Soc. 27:101.
- DeBach, P. 1964. Biological Control of Insect Pests and Weeds. London, 844 pp.
- Degeer, C. 1775. Mémoires pour Servir à l'Histoire des Insectes. Vol. 5. Stockholm, 448 pp.
- Dejean, P. F. M. A. 1837. Catalogue des Coléoptères de la Collection de M. le Comte Dejean. Troisième édition, revue, corrigée et augmentée, livr. 1-4. Paris, 468 pp.

- Della Beffa, G. 1912. Revisione dei Coccinellidi Italiani. Riv. Coleoter. Italiana. 10:145-192.
- Delucchi, V. 1954. *Pullus impexus* (Muls.) (Coleoptera, Coccinellidae), a predator of *Adelges piceae* (Ratz.) (Hemiptera, Adelgidae) with notes on its parasites. Bull. Entomol. Res. 45:243-278.
- DeVillers, C. J. 1789. Caroli Linnaei Entomologia. Vol. 1. Lugduni, 765 pp.
- Dieke, G. H. 1947. Ladybeetles of the genus *Epilachna* (sens. lat.) in Asia, Europe, and Australia. Smithsonian Inst. Misc. Coll. 106:1-183.
- Dimmock, G. W. 1906. Algunas Coccinellidae de Cuba. Inf. An. Est. Centr. Agron., 1904-1905 (1906), pp. 287-392.
- Dobzhansky, T. 1924. Die weiblichen Generationsorgane der Coccinelliden als Artmerkmal betrachtet (Col.). Entomol. Mitteil. 13:18-27.
- Dobzhansky, T. 1925a. Zur Kenntnis der Gattung *Coccinella* auct. Zool. Anz. 67:241-249.
- Dobzhansky, T. 1925b. Die palaearktischen Arten der Gattung *Coccinula* Dobzh. Zool. Anz. 67:277-284.
- Dobzhansky, T. 1926a. Die palaearktischen Arten der Gattung *Coccinella* L. Rev. Russe Entomol. 20:16-32.
- Dobzhansky, T. 1926b. Ueber die Morphologie und systematische Stellung einiger Gattungen der Coccinellidae (Tribus Hippodamiina). Zool. Anz. 69:200-208.
- Dobzhansky, T. 1926c. Sexual apparatus of Coccinellidae as specific and group characters. Izv. Acad. Nauk SSR 1926:1555-1585.
- Dobzhansky, T. 1931. The North American beetles of the genus *Coccinella*. Proc. United States Nat. Mus. 80:1-32.
- Dobzhansky, T. 1933. Geographical variation in lady-beetles. American Nat. 67:97-126.
- Dobzhansky, T. 1935. A list of Coccinellidae of British Columbia. Jour. New York Entomol. Soc. 43:331-336.
- Dobzhansky, T. 1941. Beetles of the genus *Hyperaspis* inhabiting the United States. Smithsonian Mis. Coll. 101:1-94.
- Dodge, H. R. 1938. *Coccidula suturalis* synonymy (Coleop.: Coccinellidae). Entomol. News 49:221-222.
- Dohanian, S. M. 1937. The importation of coccinellid enemies of diaspine scales into Puerto Rico. Jour. Agr. Univ. Puerto Rico 21:233-247.
- Dowden, P. B. 1962. Parasites and predators of forest insects liberated in the United States through 1960. United States Dept. Agr. Handb. 226, 70 pp.
- Dozier, H. L. 1971. A new species of *Scymnus* from Maryland (Coleoptera: Coccinellidae). Coleopterists Bull. 25:87-89.
- Drea, John J., Jr. 1956. A biological analysis of the California Chilocorini (Coleoptera: Coccinellidae). Dissertation, University of California, Graduate Division, Northern Section.
- Duponchel, P. A. J. 1841. In d'Orbigny, Dictionnaire Universel d'Histoire Naturelle. Vol. 1. Paris, 232 + 750 pp.
- Erichson, W. F. 1842. Beitrag zur Insecten-Fauna von Vandiemensland, mit besonderer Berücksichtigung der geographischen Verbreitung der Insecten, von Herausgeber. Arch. Naturg. 8:238-241.
- Essig, E. O. 1910. The natural enemies of the citrus mealy bug II. Pomona Jour. Entomol. 2:260-274.
- Essig, E. O. 1911. The natural enemies of the citrus mealy bug IV. Pomona Jour. Entomol. 3:518-520.
- Essig, E. O. 1931. A history of Entomology. New York, 1029 pp.
- Fabricius, J. C. 1775. Systema Entomologiae. Lipsiae, 832 pp.
- Fabricius, J. C. 1777. Genera Insectorum. Chilonii, 310 pp.
- Fabricius, J. C. 1780. Fauna Groenlandica. Hafniae et Lipsiae.
- Fabricius, J. C. 1781. Species Insectorum, Vol. 1. Kilonii, 522 pp.

- Fabricius, J. C. 1787. *Mantissa Insectorum. Hafniae*, Vol. 1, 348 pp., Vol. 2, 382 pp.
- Fabricius, J. C. 1792. *Entomologia Systematica. Hafniae*, Vol. 1, part 1, 330 pp., part 2, 538 pp.
- Fabricius, J. C. 1798. *Supplementum Entomologiae Systematicae. Hafniae*, 572 pp.
- Fabricius, J. C. 1801. *Systema Eleutheratorum. Kiliae*, Vol. 1, 506 pp., Vol. 2, 687 pp.
- Falderman, F. 1835. *Coleopterorum ab ill. Bungio in China boreali, Mongolia et montibus Altaicis collectorum, nee non ab ill. Turczaninoffio et Stschukino e provincia Irkutsk missorum illustrationes. Memo. Acad. Imp. Sci. St. Petersburg* 2:337-464.
- Fall, H. C. 1901. List of the Coleoptera of southern California, with notes on habits and distribution and descriptions of new species. *Occas. Pap. California Acad. Sci.* 8:1-282.
- Fall, H. C. 1904. Coleopterological notes, synonymical and descriptive. *Entomol. News* 18: 174-177.
- Fall, H. C. 1907. In H. C. Fall, and T. D. A. Cockerell. *The Coleoptera of New Mexico. Trans. American Entomol. Soc.* 33:145-272.
- Fall, H. C. 1925. New Coleoptera XI. *Canadian Entomol.* 62:309-312.
- Fall, H. C. 1926. A list of the Coleoptera taken in Alaska and adjacent parts of the Yukon Territory in the summer of 1924. *Pan-Pacific Entomol.* 2:127-154, 2:191-208.
- Fitch, A. 1862. Sixth report of the noxious, beneficial, and other insects of the state of New York. *Trans. New York St. Agr. Soc.* 21:745-868.
- Fleschner, C. A. 1959. Colonization of parasites, predators, and weed insects in California during 1959. *Dept. Biol. Cont., Univ. California, Riverside* (unpubl. report).
- Fleschner, C. A. 1960. Colonization of parasites, predators, and weed insects in California during 1960. *Dept. Biol. Cont., Univ. California, Riverside* (unpubl. report).
- Fleschner, C. A. 1961. Colonization of parasites, predators, and weed insects in California during 1961. *Dept. Biol. Cont., Univ. California, Riverside* (unpubl. report).
- Fleschner, C. A. 1962. Colonization of parasites, predators, and weed insects in California during 1962. *Dept. Biol. Cont., Univ. California, Riverside* (unpubl. report).
- Forbes, S. A. 1883. The food relations of the Carabidae and Coccinellidae, Illinois St. Lab. Nat. Hist. *Bull.* 6:33-64.
- Frost, C. A. 1920. Notes on the Coleoptera with descriptions of new species. *Canadian Entomol.* 52:229-232.
- Fürsch, H. 1958. Die mittel-europäischen Scymnini and deren Verbreitung mit besonderer Berücksichtigung Bayern (Col.: Cocc.). *Nach. Bayer. Entomol.* 7:75-91.
- Fürsch, H. 1960. Mission zoologique de l'I.R.S.A.C. en Afrique Orientale (P. Basilewsky et N. Leleup, 1957). 16. Coleoptera, Coccinellidae. *Ann. Mus. Congo Tervuren, Zool.* 81: 251-312.
- Fürsch, H. 1972. Die *Hyperaspis* Arten Afrikas mit Ausnahme des Mittelmeergebietes (Coleoptera: Coccinellidae). *Mus. Roy. l'Afrique Cent. Ann. (Ser. IN8) Sci. Zool.* 1972 (nr. 201):1-48.
- Gaines, J. C. 1933. Notes on Coccinellidae with a description of a New subspecies (Coleoptera). *Jour. New York Entomol. Soc.* 41:263-264.
- Ganglbauer, L. 1899. *Die Kafer von Mitteleuropa. Vol. 3, Familienreihe Staphylinoidea, 2. Theil: Familienreihe Clavicornia. Wien*, 1046 pp.
- Garrett, J. B. 1910. A preliminary report on the sugar-cane mealy-bug. *Louisiana Agr. Expt. Sta. Bull.* 121:3-19.
- Gebler, F. 1832. Notice sur les coléoptères qui se trouvent dans le district des mines de Nertschinsk, dans la Sibirie orientale. *Mem. Soc. Imp. Nat. Moscou* 2:23-78.
- Gemminger, M. and E. Von Harold. 1876. *Catalogus coleopterorum hucusque descriptorum synonymicus et systematicus. Vol. 12:3479-3822.*
- Germar, E. F. 1833. *Conspectus generum Cicadarium, quem proponit E. F. Germar. Silberman Rev. Entomol.* 1833:174-184.

- Ghorpade, K. D. 1981. *Cryptolaemus montrousieri* (Coleoptera: Coccinellidae) breeding on aphids. *Colemania* 1:59.
- Gmelin, S. G. 1790. *Linn. Syst. Nat.*, ed. 13, 664 pp.
- Goeze, J. A. E. 1777. *Entomologische Beiträge zu des Ritter Linné. 12. Augabe der Natursystems. Vol. 1. Leipzig*, 736 pp.
- Gordon, R. D. 1970a. New genera and species of Coccinellidae from the western United States (Coleoptera). *Proc. Entomol. Soc. Washington* 72:42–50.
- Gordon, R. D. 1970b. The genus *Cephaloscymnus* Crotch in North America (Coleoptera: Coccinellidae). *Proc. Entomol. Soc. Washington* 72:66–70.
- Gordon, R. D. 1970c. Tribal and generic reassignments in the Coccinellidae (Coleoptera). *Proc. Entomol. Soc. Washington* 72:217.
- Gordon, R. D. 1970d. A review of the genus *Microweisea* Cockerell with a description of a new genus and species of Coccinellidae from North America (Coleoptera). *Proc. Entomol. Soc. Washington* 72:207–217.
- Gordon, R. D. 1970e. A review of the genus *Delphastus* Casey (Coleoptera: Coccinellidae). *Proc. Entomol. Soc. Washington* 72:356–369.
- Gordon, R. D. 1970f. A review of the genus *Nipus* Casey (Coleoptera: Coccinellidae). *Coleopterists Bulletin* 24:71–75.
- Gordon, R. D. 1970g. The genus *Zagloba* in Central and South America. *Proc. Entomol. Soc. Washington* 72:479–484.
- Gordon, R. D. 1971. A generic review of the Cryptognathini, new tribe, with a description of a new genus (Coleoptera: Coccinellidae). *Acta Zool. Lilloana* 26:181–196.
- Gordon, R. D. 1972a. The tribe Noviini of the New World (Coleoptera: Coccinellidae). *Jour. Washington Acad. of Sci.* 62:23–31.
- Gordon, R. D. 1972b. A review of the genus *Nephaspis* Casey and a comparison with the genus *Clitostethus* Weise (Coleoptera: Coccinellidae). *Rev. Agr. Piracicaba* 47:145–154.
- Gordon, R. D. 1974a. Notes on North American species of Chilocorini (Coleoptera: Coccinellidae) with descriptions of two new species of *Exochomus* from Mexico. *Coleopterists Bull.* 28:1–6.
- Gordon, R. D. 1974b. Notes on *Neoharmonia* Crotch (Coleoptera: Coccinellidae) in the United States and Mexico. *Proc. Entomol. Soc. Washington* 76:165–171.
- Gordon, R. D. 1974c. New synonymy and lectotype designations in North American Coccinellidae (Coleoptera). *Coleopterists Bull.* 28:209–210.
- Gordon, R. D. 1974d. Two new species of *Cephaloscymnus* Crotch from Mexico with notes on other species (Coleoptera: Coccinellidae). *Coleopterists Bull.* 28:45–48.
- Gordon, R. D. 1976a. A revision of the Epilachninae of the Western Hemisphere (Coleoptera: Coccinellidae). *United States Dept. Agr. Tech. Bull.* 1493:1–409.
- Gordon, R. D. 1976b. The Scymnini (Coleoptera: Coccinellidae) of the United States and Canada: key to genera and revision of *Scymnus*, *Nephus* and *Diomus*. *Bull. Buffalo Soc. Nat. Sci.* 28:1–362.
- Gordon, R. D. 1977. Classification and phylogeny of the New World Sticholotidinae (Coccinellidae). *Coleopterists Bull.* 31:185–228.
- Gordon, R. D. 1980. The tribe Azyini (Coleoptera: Coccinellidae): historical review and taxonomic revision. *Trans. American Entomol. Soc.* 106:149–203.
- Gordon, R. D. 1982. An Old World species of *Scymnus* (*Pullus*) established in Pennsylvania and New York (Coleoptera: Coccinellidae). *Proc. Entomol. Soc. Washington* 84:250–255.
- Gordon, R. D. and E. A. Chapin. 1983. A revision of the New World species of *Stethorus* Weise (Coleoptera: Coccinellidae). *Trans. American Entomol. Soc.* 109:229–276.
- Gorham, H. S. 1891. *Biologia Centrali-Americana, Insecta, Coleoptera, Endomychidae, Coccinellidae* 7:150–160.

- Gorham, H. S. 1892. *Biologia Centrali-Americana*, Insecta, Coleoptera: Coccinellidae 7:161–176.
- Gorham, H. S. 1894. *Biologia Centrali-Americana*, Insecta, Coleoptera: Coccinellidae 7:177–208.
- Gorham, H. S. 1895. *Biologia Centrali-Americana*, Insecta, Coleoptera: Coccinellidae 7:209–216.
- Gorham, H. S. 1897. *Biologia Centrali-Americana*, Insecta, Coleoptera: Coccinellidae 7:217–240.
- Gorham, H. S. 1898. *Biologia Centrali-Americana*, Insecta, Coleoptera: Coccinellidae, supplement to Erotylidae 7:241–256.
- Guérin-Méneville, F. E. 1829–1844. *Iconographie du Règne Animal de Cuvier*. Vol. 7, Insectes, 1829–1838. Paris, 576 pp.
- Haussler, G. J. and D. W. Clancy. 1944. Natural enemies of Comstock mealybug in the eastern states. *Jour. Canadian Entomol.* 37:503–509.
- Hagen, K. S. 1962. Biology and ecology of predaceous Coccinellidae. *Ann. Rev. Entomol.* 7: 289–326.
- Hagen, K. S. 1974. The significance of predaceous Coccinellidae in biological and integrated control of insects. *Entomophaga*, Mem. H. S. 7:25–44.
- Hagen, K. S. and J. M. Franz. 1973. A history of biological control. Pages 433–476, in Smith, Mittler and Smith (eds.), *History of Entomology*. Ann. Rev. Inc., Palo Alto, California, 517 pp.
- Hall, J. C. and C. A. Fleschner. 1958. A new species of *Stethorus* Weise from Guatemala now being released in California. *Pan-Pacific Entomol.* 34:98–100.
- Hatch, M. H. 1961. Beetles of the Pacific Northwest, part III: Pselaphidae and Diversicornia. Univ. Washington Press, Seattle, 503 pp.
- Hekki, H., S. Koponen and T. Laine. 1978. On the feeding biology of *Coccinella hieroglyphica* L. (Col., Coccinellidae). *Rep. Kevo Subarctic Res. Sta.* 14:18–20.
- Henriksen, K. L. 1939. A revised index of the insects of Gronland. *Meddel. om Gronland* 119:10.
- Henriksen, K. L. and W. Lundbeck. 1918. Landarthropoder (Insecta et Arachnida). *Meddel. om Gronland*. 22:481–823.
- Herbert, F. B. 1920. Cypress bark scale. United States Dept. Agr. Bull. No. 838:1–21.
- Herbst, J. F. W. 1783. *Kritisches Verzeichniss meiner Insecten-Sammlung*. Volume 3, pp. 1–68 in J. C. Fuessly, *Archiv der Insectengeschichte*. H. Steiner, Zurich und Winterthur.
- Herbst, J. F. W. 1793. *Natursystem aller bekannten In- und Ausland Insecten*, Der Käfer Band 5. Berlin, 392 pp.
- Herbst, J. F. W. 1797. *Natursystem aller bekannten In- und Ausländischen Insecten*; Der Käfer nach dem System des Ritters Carl von Linné bearbeitet (von C. G. Jablonsky) fortgesetzt von J. F. W. Herbst. Band 7. Berlin, 346 pp.
- Hodek, I. 1966. Ecology of aphidophagous insects. Proc. symposium held in Liblice near Prague, September 27–October 1st, 1965. Academia, Prague, 360 pp.
- Hodek, I. 1967. Bionomics and ecology of predaceous Coccinellidae. *Ann. Rev. Entomol.* 12: 79–104.
- Hodek, I. et al. 1973. Biology of Coccinellidae. Academia, Czechoslovak Acad. Sci., Prague, 260 pp.
- Hoebeke, E. R. In press. New records of *Scymnus (Pullus) suturalis* in eastern North America (Coleoptera: Coccinellidae). *Coleopterists Bull.*
- Hoebeke, E. R. and A. G. Wheeler, Jr. 1980. New distribution records of *Coccinella septempunctata* L. in the eastern United States (Coleoptera: Coccinellidae). *Coleopterists Bull.* 34:209–212.

- Hope, F. W. 1840. The Coleopterist's Manual, Part the Third, Containing Various Families, Genera, and Species of Beetles Recorded by Linnaeus and Fabricius. Also Descriptions of Newly Discovered and Unpublished Insects. London, 191 pp.
- Horn, G. H. 1880. *In*: Proceedings of the monthly meetings (Sept. 10, 1980) of the entomological section of the Academy of Natural Sciences, Philadelphia. Trans. American Entomol. Soc. 8:x-xiii.
- Horn, G. H. 1886. Notes from the museum at Cambridge. Trans. American Entomol. Soc. 13:xiv.
- Horn, G. H. 1895. Studies in Coccinellidae. Transactions of the American Entomol. Soc. 22: 81-114.
- Huber, J. P. 1842. Mémoire pour servir à l'histoire de la *Coccinella* de la Saponaire. Mem. Soc. Phys. Geneve 9:363-374.
- Huffaker, C. B. and R. L. Doutt. 1965. Establishment of the Coccinellid *Chilocorus bipustulatus* Linnaeus, in California olive groves. Pan-Pacific Entomol. 41:61-63.
- Huffaker, C. B. and P. S. Messenger. 1976. Theory and practice of biological control. New York, San Francisco, London, 788 pp.
- Iablokoff-Khnzorian, S. M. 1970. New species of beetles from Armenia and other lands of USSR (Insecta, Coleoptera). Zool. Pap., Erevan 15:50-80.
- Iablokoff-Khnzorian, S. M. 1979. Genera der palaarktischen Coccinellini (Coleoptera, Coccinellidae). Entomol. Blatt. 75:37-75.
- Iablokoff-Khnzorian, S. M. 1982. Les Coccinelles Coleoptères-Coccinellidae Tribu Coccinellini des regions Paléarctique et Orientale. Paris, 568 pp.
- Illiger, J. C. W. 1798. *In* Kugelann, Verzeichniss der Käfer Preussens, Ausgearbeitet von Illiger, mit einer Vorrede von Hellwig und dem Angehängten Versuch einer Natürlichen Ordnung und Gattungs Folge der Insecten. Halle, 510 pp.
- Jacobson, G. G. 1904-1916. Die Käfer Russlands und West Europas. Ein Handbuch zum Bestimmen der Käfer. Petrograd, pp. 865-1024.
- Jaeger, B. 1859. The Life of North American Insects. New York, 170 pp.
- Johnson, R. H. 1910. Determinate evolution in the color pattern of the lady-beetles. Carnegie Institution, Washington, Publ. No. 122, 104 pp.
- Kamiya, H. 1961. A revision of the tribe Scymnini from Japan and the Loochoos (Coleoptera: Coccinellidae). 1. Genera *Clitostethus*, *Stethorus* and *Scymnus* (except subgenus *Pullus*) Jour. Fac. Agr. Kyushu Univ. 11:275-302.
- Kamiya, H. 1963. A revision of the tribe Hyperaspini of Japan (Coleoptera: Coccinellidae). Mem. Fac. Lib. Arts, Fukui Univ. Ser. II, Nat. Sci. 13:79-86.
- Kamiya, H. 1964. Comparative morphology of larvae of the Japanese Coccinellidae, with special reference to the tribal phylogeny of the family (Coleoptera). Mem. Fac. Lib. Arts. Fukui University, Series II. Nat. Sci. 14:83-100.
- Kamiya, H. 1966. On the Coccinellidae attacking the scale insects and mites in Japan and the Ryukyus. Mushi 39:65-93.
- Kamiya, H. 1979. A revision of the tribe Chilocorini of Japan and the Loochoos (Coleoptera: Coccinellidae). Kontyu 27:99-104.
- Kapur, A. P. 1948. On the Old World species of the genus *Stethorus* Weise (Coleoptera: Coccinellidae). Bull. Entomol. Res. 39:297-320.
- Kirby, W. 1837. *In*: Fauna Boreali-Americana by Sir J. Richardson *et al.*, 1829-1837. The Insects. Part 4. London, 325 pp.
- Korschefsky, R. 1931. Coleopterorum Catalogus. Pars 118. Coccinellidae. I. Berlin, 224 pp.
- Korschefsky, R. 1932. Coleopterorum Catalogus. Pars 120. Coccinellidae. II. Berlin, 435 pp.
- Korschefsky, R. 1935. Entomological Expedition to Abyssinia, 1926-7. Coleoptera, Coccinellidae. Ann. Mag. Nat. Hist. (10)16:53-65.

- Kugelann, J. G. 1792–1794. Verzeichniss der in einigen Gegenden Preussens bis jetzt entdeckten Käfer-Arten nebst kurz Nachrichten von denselben. *Neues Mag. Entomol.* 2: 252–256, 3:257–306, 4:477–512, 5:513–582.
- Kugelann, J. G. 1798. See Illiger, 1798.
- Laporte, F. L. 1840. *Histoire naturelle des animaux articulés* 2:1–564. Paris.
- Larochelle, A. 1979. Les Coleopteres Coccinellidae du Quebec. *Cordulia*, Suppl. 10:1–111.
- Latreille, P. A. 1807. *Genera Crustaceorum et Insectorum Secundum Ordinem Naturalem in Familias Disposita, Iconibus Exemplisque Plurimus Explicata*. Vol. 3. Paris, 258 pp.
- Latreille, P. A. 1818. *In: Cuvier, Le Règne Animal*, Vol. 3. Paris, 653 pp.
- Latreille, P. A. 1833. *Insectes de l'Amérique équinoxiale*. Pages 65–96 *in: A. Humboldt and A. Bonpland, Recueil d'Observations de Zoologie et d'Anatomie Comparée; Faites dans l'Océan Atlantique, dans l'Intérieur du Nouveau Continent et dans la Mer du Sud, Pendant les Années, 1799, 1800, 1801, 1802 et 1803*, Vol. 2. Paris.
- Leach, W. E. 1815a. The zoological miscellany, Vol. 2. London. 154 pp.
- Leach, W. E. 1815b. *In: Brewster, Articles on entomology*. *Edinburgh Encyclop.* 9:57–172. Edinburgh.
- LeConte, J. L. 1824. Description of some new species of North American insects. *Ann. Lyc. Nat. Hist. New York* 1:169–173.
- LeConte, J. L. 1850. General remarks upon the Coleoptera of Lake Superior. Pages 201–242 *in: Agassiz, Lake Superior: Its Physical Character, Vegetation and Animals, Compared with Those of Other and Similar Regions*. Boston.
- LeConte, J. L. 1852. Remarks upon the Coccinellidae of the United States. *Proc. Acad. Nat. Sci. Philadelphia* 6:129–145.
- LeConte, J. L. 1854. Descriptions of some new Coleoptera from Oregon. *Proc. Acad. Nat. Sci. Philadelphia* 7:16–20.
- LeConte, J. L. 1858. Descriptions of new species of Coleoptera, chiefly collected by the United States and Mexican Boundary Commission, under Maj. W. H. Emory, U.S.A. *Proc. Acad. Nat. Sci. Philadelphia* 10:59–89.
- LeConte, J. L. 1859a. Catalogue of the Coleoptera of Fort Tejon, California. *Proc. Acad. Nat. Sci. Philadelphia* 11:69–90.
- LeConte, J. L. 1859b. Additions to the coleopterous fauna of northern California and Oregon. *Proc. Acad. Nat. Sci. Philadelphia* 11:281–292.
- LeConte, J. L. 1859c. *In: Say, A Description of the Insects of North America*. Boston, 412 pp.
- LeConte, J. L. 1859d. The Coleoptera of Kansas and eastern New Mexico. *Smithsonian Cont. Knowl.* 11:1–58.
- LeConte, J. L. 1860 (1857). Report on explorations and surveys, etc. from the Mississippi River to the Pacific Ocean. No. 1. Report upon Insects Collected on the Survey 9:1–72. Washington.
- LeConte, J. L. 1861. New species of Coleoptera inhabiting the Pacific district of the United States. *Proc. Acad. Nat. Sci. Philadelphia* 13:338–359.
- LeConte, J. L. 1878a. Additional descriptions of new species. *In: Schwarz, The Coleoptera of Florida*. *Proc. American Philo. Soc.* 17:353–372.
- LeConte, J. L. 1878b. The Coleoptera of the alpine regions of the Rocky Mountains. *Bull. United States Geol. and Geog. Surv.* 4:447–480.
- LeConte, J. L. 1880. Short studies of North American Coleoptera. *Trans. American Entomol. Soc.* 8:163–218.
- LeConte, J. L. 1883. The complete writings of Thomas Say on the entomology of North America. Boston, Vol. I, 412 pp. Vol. II, 814 pp.
- Leeper, J. R. 1976. A review of the Hawaiian Coccinellidae. *Proc. Hawaiian Entomol. Soc.* 22:279–305.

- Leng, C. W. 1903a. Notes on Coccinellidae. Jour. New York Entomol. Soc. 11:35–45.
- Leng, C. W. 1903b. Notes on Coccinellidae. II. Jour. New York Entomol. Soc. 11:193–213.
- Leng, C. W. 1908. Notes on Coccinellidae. III. Jour. New York Entomol. Soc. 16:33–44.
- Leng, C. W. 1911. The species of *Brachyacantha* of North and South America. Bull. American Mus. Nat. Hist. 30:279–333.
- Leng, C. W. 1919. Family Coccinellidae. Pages 17–18 in Report of the Canadian Arctic Expedition 1913–18. Volume III: Insects. Part E: Coleoptera. Coccinellidae, Elateridae, Chrysomelidae, and Rhynchophora (excluding Ipidae). Ottawa.
- Leng, C. W. 1920. Catalogue of the Coleoptera of America, north of Mexico. Mount Vernon, New York, 470 pp.
- Leng, C. W. and A. J. Mutchler. 1927. Supplement to Catalogue of the Coleoptera of America, North of Mexico. Mount Vernon, New York, 78 pp.
- Leng, C. W. and A. J. Mutchler. 1933. Second and third supplements 1925 to 1932 (inclusive) to catalogue of Coleoptera of America, north of Mexico. Mount Vernon, New York, 112 pp.
- Lewis, G. 1873. Notes on Japanese Coccinellidae. Entomol. Mon. Mag. 10:54–56.
- Lewis, G. 1896. On the Coccinellidae of Japan. Ann. Mag. Nat. Hist. London 17:22–41.
- Li, C. S. and E. F. Cook. 1961. The Epilachninae of Taiwan (Col: Coccinellidae). Pacific Ins. 3:31–91.
- Linnaeus, C. 1758. Systema Naturae, 10th edition. Stockholm, 826 pp.
- Linnaeus, C. 1763. Centuria Insectorum Rariorum. Uppsala, 32 pp.
- Linnaeus, C. 1767. Systema Naturae, 12th edition. Stockholm, 830 pp.
- Lusis, J. J. 1947. Some aspects of the population increase in *Adalia bipunctata* L. 1. Heterozygosity of populations in lethal alleles. Dok. Akad. Nauk USSR 57:825–828.
- Mader, L. 1924. Bestimmungs-Tabellen der europäischen Coleopteren. 94. Heft. Coccinellidae, Tribus Scymnini. Troppau, 48 pp.
- Mader, L. 1926–1934. Evidenz der paläarktischen Coccinelliden und ihrer Aberrationen in Wort und Bild. I—Teil: Epilachnini, Coccinellini, Halyziini, Synonchini. Zeit. Ver. Nat. Wien. 1926(1):1–24, 1927(2):25–48, 1928(3):49–76, 1929(4):77–124, 1930(5):124–168, 1931(6):169–204, 1932(7):205–244, 1933(8):245–288, 1934(9):289–336.
- Mader, L. 1935–1936. Evidenz der paläarktischen Coccinelliden und ihrer Aberrationen in Wort und Bild. I. Teil: Epilachnini, Coccinellini, Halyziini, Synonymichin. Entomol. Anz. Wien. 1935(15):337–372, 1936(16):373–412.
- Mader, L. 1937. Evidenz der paläarktischen Coccinellidae und ihrer Aberrationen in Wort und Bild. Entomol. Nach. Troppau 11:41–66.
- Mader, L. 1950. Exploration du parc national Albert. Mission de Witte (1933–1935), Coccinellidae, 2:3–136. Brussels.
- Mader, L. 1954. Weiteres über Coccinelliden aus der Sammlung des Naturhistorischen Museums in Wien. Koleopt. Rdsch. 32:123–131.
- Mader, L. 1955. Evidenz der paläarktischen Coccinelliden und ihrer Aberrationen in Wort und Bild, 2. Entomol. Arb. Mus. G. Frey Tutzing, Muench. 6:765–1035.
- Mader, L. 1958. Die amerikanischen Coccinelliden der Gruppe Synonymichini. Ann. Naturhist. Mus. Wien 62:236–249.
- Malkin, B. 1943a. Two new Coccinellidae from Oregon (Coleoptera). Pan-Pacific Entomol. 19:109–111.
- Malkin, B. 1943b. A catalogue of Oregon Coccinellidae. Jour. New York Entomol. Soc. 51:191–198.
- Malkin, B. 1949. Notes on Oregon Coccinellidae, Coleoptera. Jour. New York Entomol. Soc. 57:133–134.
- Malkin, B. 1955. Some California species of *Hyperaspis* new and old (Coleoptera: Coccinellidae). Pan-Pacific Entomol. 31:29–31.

- Mann, W. M. 1911. On some northwestern ants and their guests. *Psyche* 18:102-109.
- Mannerheim, C. C. 1843. Beitrag zur Käfer-Fauna der Aleutischen Inseln, der Insel Sitka und Neu California. *Bull. Soc. Imp. Nat. Moscou*. 16:175-314.
- Marshall, G. A. K. 1912. Three new species of neotropical Coccinellidae. *Ann. Mag. Nat. Hist. (Ser. 8)* 10:320-322.
- Marshall, M. T. 1945. Note on *Hyperaspidius flavocephalus* Blatchley, with description of the female (Coleoptera, Coccinellidae). *Canadian Entomol.* 77:177-178.
- McGugan, B. M. and H. C. Coppel. 1962. A review of the Biological Control attempts against insects and weeds in Canada. Part II. Biological control of forest insects, 1910-1958. *Commonwealth Inst. Bio. Control Tech. Commun.* 2:35-127.
- McKenzie, H. L. 1936. An anatomical and sytematic study of the genus *Anatis* of America (Coleoptera: Coccinellidae). *Univ. California Publ. Entomol.* 6:263-270.
- McMullen, D. R. and C. Jong. 1967. New records and discussions of predators of the Psylla, *Psylla pyricola* Forster, in British Columbia. *Jour. Entomol. Soc. British Columbia* 64: 132-178.
- Melsheimer, F. E. 1847. Descriptions of new species of Coleoptera of the United States. *Proc. Acad. Nat. Sci. Philadelphia* 3:158-181.
- Melsheimer, F. E. 1853. Catalogue of the Described Coleoptera of the United States by Friedrich Ernst Melsheimer, M.D. Revised by S. S. Haldeman and J. L. LeConte. *Smithsonian Institution, Washington, D.C.*, 174 pp.
- Mitchell, R. G. and K. H. Wright. 1967. Foreign predator introductions for control of the balsam woolly aphid in the Pacific Northwest. *Jour. Econ. Entomol.* 60:140-147.
- Miyatake, M. 1961. The east-asian coccinellid beetles preserved in the California Academy of Sciences, tribe Hyperaspini. *Mem. Ehime Univ., section VI (Agriculture)* 6:147-155.
- Motschulsky, V. 1845a. Insectes de la Sibirie rapportés d'un voyage faiten 1839-40. *Mem. Acad. St. Petersburg* 13:1-274.
- Motschulsky, V. 1845b. Observations sur le Musée Entomologique de l'Université Impériale de Moscou. *Bull. Soc. Imp. Nat. Moscou* 18:332-388.
- Motschulsky, V. 1866. Essai d'un catalogue des insectes de l'île de Ceylan, supplement. *Bull. Soc. Imp. Nat. Moscou* 39:395-446.
- Muller, O. F. 1776. *Zoologiae Danicae prodromus, Sev animalium Daniae et Norwegiae indigenarum characteres, nomina, et Synonyma inprimis popularium* 32:1-282. Hafniae, Hallager.
- Mulsant, M. E. 1846. *Histoire naturelle des Coléopterès de France: Sulcicolles-Sécuripalpes*. Paris, 280 pp.
- Mulsant, M. E. 1850. Species de Coléoptères trimères sécuripalpes. *Ann. Sci. Phys. Nat. Lyon* 2:1-1104.
- Mulsant, M. E. 1853. Supplement a la monographie des Coléoptères trimères sécuripalpes. *Opusc. Entomol.* 3:1-178.
- Mulsant, M. E. 1856. Additions et rectifications au catalogue des coccinellides, publié en 1853. *Ann. Soc. Linn. Lyon* 3:135-156.
- Mulsant, M. E. 1866. Monographie des coccinellides. *Mem. Acad. Sci. Lyon* 15:1-112.
- Muma, M. H. 1955. Lady beetles (Coccinellidae: Coleoptera) found on citrus in Florida. *Florida Entomol.* 38:117-124.
- Muma, M. H., A. G. Selhime and H. A. Denmark. 1961. An annotated list of predators and parasites associated with insects and mites on Florida citrus. *Florida Agr. Exp. sta. Bull.* 634:3-39.
- Newell, I. M. 1971. Colonization of beneficial organisms in California, 1971. *Div. Biol. Cont., Dept. Entomol., Univ. Calif., Riverside* (unpubl. report).
- Newell, I. M. 1972. Colonization of beneficial organisms in California, 1972. *Div. Biol. Cont., Dept. Entomol., Univ. Calif., Riverside* (unpubl. report).

- Newell, I. M. 1973. Colonization of beneficial organisms in California, 1973. Div. Biol. Cont., Dept. Entomol., Univ. Calif., Riverside (unpubl. report).
- Newell, I. M. 1974. Colonization of beneficial organisms in California, 1974. Div. Biol. Cont., Dept. Entomol., Univ. Calif., Riverside (unpubl. report).
- Newell, R. H. 1845. The Zoology of the English poets, Corrected by the Writings of Modern Naturalists. London, 240 pp.
- Nunenmacher, F. W. 1909. Two new species of Coccinellidae (Coleoptera). Entomol. News 22:161-162.
- Nunenmacher, F. W. 1911. Studies amongst the Coccinellidae, No. 2 (Col.). Entomol. News 22:71-74.
- Nunenmacher, F. W. 1912. Studies amongst the Coccinellidae, No. 4. (Coleoptera). Entomol. News 23:448-451.
- Nunenmacher, F. W. 1913. Studies amongst the Coccinellidae, No. 5. (Coleoptera). Entomol. News 24:76.
- Nunenmacher, F. W. 1934a. Studies amongst the Coccinellidae, No. 6. New species. Pan-Pacific Entomol. 10:17-21.
- Nunenmacher, F. W. 1934b. Studies amongst the Coccinellidae, No. 7. (Coleoptera). Pan-Pacific Entomol. 10:113-114.
- Nunenmacher, F. W. 1937. Studies amongst the Coccinellidae, No. 8. (Coleoptera). Pan-Pacific Entomol. 13:182-183.
- Nunenmacher, F. W. 1944. Studies amongst the Coccinellidae, No. 9. (Coleoptera). Pan-Pacific Entomol. 20:144-146.
- Nunenmacher, F. W. 1946. Studies amongst the Coccinellidae, No. 10. (Coleoptera). Pan-Pacific Entomol. 22:72-73.
- Nunenmacher, F. W. 1948. Studies amongst the Coccinellidae, No. 11. (Coleoptera). Pan-Pacific Entomol. 24:6-8.
- Nutting, W. H. 1980. New California *Hyperaspis* (Coleoptera: Coccinellidae). Pan-Pacific Entomol. 56:260-264.
- Oke, C. G. 1951. The Coleoptera of the Russell Grimwade Expedition. Mem Nat. Mus. Victoria 17:19-25.
- Olivier, A. G. 1791. Encyclopédie méthodique. Histoire naturelle. Insectes 6:1-368.
- Olivier, A. G. 1808. Entomologie, ou Histoire Naturelle des Insectes, avec leurs Caractères Génériques et Spécifiques, leur Description, leurs Synonymie, et leurs Figures Enluminée. Coléoptères, Vol. 5. Paris.
- Palmer, M. A. 1911. Some notes on heredity in the coccinellid genus *Adalia* Mulsant, Ann. Entomol. Soc. America 4:283-302.
- Palmer, M. A. 1914. Some notes on life history of lady-beetles. Ann. Entomol. Soc. America 7:213-238.
- Palmer, M. A. 1917. Additional notes on heredity and life history in the Coccinellid genus *Adalia* Mulsant. Ann. Entomol. Soc. America 10:289-302.
- Panzer, G. W. F. 1813. Index Entomologicus sistens omnes Insectorum, Pars I. Eleutherata. 216 pp.
- Paykull, G. 1798. Anmarkningar vid genus *Coccinella* och beskrifnig ofver de Svenska arter deraf som aro med fine har bestrodde. Vetensk. Acad. Handl. 19:144-156.
- Pope, R. D. 1957. South African animal life, Coleoptera. Coccinellidae 4:292-322.
- Pope, R. D. 1962. A review of the Pharini (Coleoptera: Coccinellidae). Ann. Mag. Nat. Hist., Ser. 13(1961):627-640.
- Pope, R. D. 1981. "*Rhyzobius ventralis*" (Coleoptera: Coccinellidae), its constituent species, and their taxonomy and historical roles in biological control. Bull. Ent. Res. 71:19-31.
- Provancher, L. 1877. Petite Faune du Canada Précédée d'un Traité élémentaire d'Entomologie. Vol. 1—Les Coléoptères. Quebec, 786 pp.

- Randall, J. 1838a. Description of new species of coleopterous insects inhabiting the State of Maine. *Boston Jour. Nat. Hist.* 2:1-33.
- Randall, J. 1838b. Descriptions of new species of coleopterous insects inhabiting the State of Massachusetts. *Boston Jour. Nat. Hist.* 2:34-52.
- Redtenbacher, L. 1844. *Tentamen Dispositionis Generum et Specierum Coleopterorum Pseudotrimerorum Archiducatus Austriae. Vindobonae*, 32 pp.
- Reitter, E. 1897. *Funfzehnter Beitrag zur Coleoptera-Fauna des Russischen Reiches*. Wien. Ent. Zeit. 16:121-127.
- Reitter, E. 1911. *Fauna Germanica. Die Kafer des Deutschen Reiches. Nach der Analytischen Methode Bearbeitet*. Vol. 4. Stuttgart, 236 pp.
- Reitter, E., L. Heyden, and J. Weise. 1891. *Catalogus Coleopterorum Europae, Caucasi et Armeniae Rossicae*. Modling, 420 pp.
- Riley, C. V. 1893. An Australian *Scymnus* established and described in California. *Insect Life* 5:127-128.
- Riley, C. V. 1894. Report of the Entomologist for 1893. United States Dept. Agr. Washington, pp. 199-226.
- Rossi, P. 1790. *Fauna Etrusca Sistens Insecta quae in Provinciis Florentina et Pisana Praesertim Collegit*. Vol. 1, pp. 1-272.
- Rossi, P. 1792-1794. *Mantissa Insectorum. Exhibens species nuper in Etruria collectas a Petro Rossio. Posa, Polloni*, 154 pp.
- Russell, L. 1968. Recently introduced beetles in the Pacific Northwest. *Coleopterists Bull.* 22: 62-63.
- Rye, E. C. 1873. *Insecta. In: Zoo Record for 1873*, Vol. 8.
- Sasaji, H. 1967. A revision of the Formosan Coccinellidae (I). The Subfamily Sticholotinae, with an establishment of a new tribe (Coleoptera). *Etizenia, Occ. Pub. Biol. Lab. Fukui Univ.* 25:1-28.
- Sasaji, H. 1968. Phylogeny of the family Coccinellidae (Coleoptera). *Etizenia, Occ. Pub. Biol. Lab. Fukui Univ.* 35:1-37.
- Sasaji, H. 1971a. *Fauna Japonica: Coccinellida (Insecta: Coleoptera)*. Tokyo, 345 pp.
- Sasaji, H. 1971b. Phylogenetic positions of some remarkable genera of the Coccinellidae (Coleoptera), with an attempt of the numerical method. *Mem. Fac. Edu., Fukui Univ., Ser. II, Nat. Sci.* 21:55-73.
- Savoyskaya, G. I. 1969. On the formation of new taxonomic categories of coccinellids (Col., Coccinellidae). *Vest. Sel. Nauki, Alma-Ata* 9:101-106.
- Say, T. 1824. Narrative of an expedition to the source of the St. Peter's River, etc., under the command of Stephen H. Long, Major, U.S.T.E. *Jour. Acad. Nat. Sci. Philadelphia* 2: 268-378.
- Say, T. 1825. Descriptions of coleopterous insects collected in the last expedition to the Rocky Mountains, performed by order of Mr. Calhoun, Secretary of War, under the command of Major Long. *Jour. Acad. Nat. Sci. Philadelphia* 4:83-99.
- Say, T. 1826. Descriptions of new species of coleopterous insects inhabiting the United States. *Jour. Acad. Nat. Sci. Philadelphia* 5:238-284, 293-304.
- Say, T. 1835. Descriptions of new American coleopterous insects, and observations on some already described. *Boston Nat. Hist.* 1:151-203.
- Schaeffer, C. 1905. Some additional new genera and species of Coleoptera found within the limit of the United States. *Brooklyn Inst. Arts. Sci. Mus. Bull.* 1:141-179.
- Schaeffer, C. 1908. On new and known Coleoptera of the families Coccinellidae and Cleridae. *Jour. New York Entomol. Soc.* 16:125-135.
- Schaeffer, C. 1912. *Coccinella undecimpunctata* Linn. in Massachusetts. *Psyche* 19:104-105.
- Schilder, F. A. and M. Schilder. 1928. Die Nahrung der Coccinelliden und ihre Beziehung zur Verwandtschaft der Arten. *Arb. Biol. Reich. Land- und Forstwirtschaft* 16:213-282.

- Schneider, D. H. 1792. *Neuestes Magazin für die Liebhaber der Entomologie*. Volume 2. Stralsund und Leipzig, Struck, pp. 128–256.
- Schott, F. M. 1926. Some newcomers. *Bull. Brooklyn Entomol. Soc.* 21:17.
- Schwarz, E. A. 1878. The Coleoptera of Florida. *Proc. American Philos. Soc.* 17:353–372, 434–472.
- Schwarz, E. A. 1890. Myrmecophilous Coleoptera found in temperate North America. *Proc. Entomol. Soc. Washington* 1:237–247.
- Schwarz, E. A. 1902. Minutes of 163rd regular meeting, November 14, 1901. *Proc. Entomol. Soc. Washington* 5:39.
- Schwarz, E. A. 1904. A new coccinellid enemy of the San Jose scale. *Proc. Entomol. Soc. Washington* 4:118–119.
- Scott, F. T. 1933. Additions to the Coccinellidae of Alaska. *Pan-Pacific Entomol.* 9:126.
- Scriba, L. G. 1790. *Journal für die Liebhaber der Entomologie*. Part II. Frankfurt, pp. 97–192.
- Scriba, L. G. 1791. *Beiträge zu der Insecten Geschichte* 2:69–194.
- Selhime, A. G. 1955. *Cheilomenes sexmaculata* F., an imported beneficial lady beetle. *Florida St. Hort. Soc.* 68:112–113.
- Selhime, A. G. 1956. *Brumus suturalis*, a beneficial lady beetle. *Florida Entomol.* 39:65–68.
- Semenov-Tian-Shanskij, A. and T. Dobzhansky. 1923. Tres novae Coccinellidarum species e fauna Rossiae Asiaticae (Coleoptera). *Rev. Russe Entomol.* 18:99–102.
- Semjanov, V. P. 1980. Biology of the ladybird beetle *Calvia quattuordecimguttata* L. (Coleoptera: Coccinellidae). *Ent. Rev.* 59(4):47–53.
- Sharma, M. L. and P. Martel. 1972. Some notes on *Microwiseia marginata* (LeConte) (Coleoptera: Coccinellidae), predator of the pine needle scale *Phenacaspis pinifoliae* (Fitch). *Folia Entomol. Mexicana* 23-24:122–123.
- Sharp, D. 1889. Two new species of *Scymnus*. *Insect Life* 1:364–365.
- Shorey, H. H. 1975. Colonization of beneficial organisms in California, 1975. *Div. Biol. Cont., Dept. Entomol., Univ. Calif., Riverside* (unpubl. report).
- Shorey, H. H. 1976. Colonization of beneficial organisms in California, 1976. *Div. Biol. Cont., Dept. Entomol., Univ. Calif., Riverside* (unpubl. report).
- Sicard, A. 1907a. Coléoptères Coccinellides du Japon, recueillis par M. Harmand et Gallois. *Bull. Mus. Nat. Hist. Paris* 1907:211.
- Sicard, A. 1907b. Description d'une nouvelle espèce de Coccinellide paléarctique (Col.). *Bull. Soc. Ent. France* 5:67–68.
- Sicard, A. 1909. Revision des Coccinellides de la faune Malgache. *Ann. Soc. Entomol. France* 78:1–165.
- Sicard, A. 1912. Notes sur quelques Coccinellides de l'Inde et de Birmanie et description d'espèces et de variétés nouvelles. *Ann. Soc. Entomol. France* 81:495–506.
- Sicard, A. 1922. Descriptions de variétés, espèces et genres nouveau appartenant à la famille des coccinellides. *Ann. Mag. Nat. Hist.* (series 9) 11:349–360.
- Silvestri, F. 1909. Nuovo Coccinellide introdotto in Italia (1). *Rev. Coleott. Italiana* 7126–129.
- Smith, H. S. 1915. Recent ladybird introductions. *California State Comm. Hort. Month Bull.* 4:523–524.
- Smith, J. B. 1886. Ants nests and their inhabitants. *American Nat.* 20:679–687.
- Smith, S. G. 1959. The cytogenetic basis of speciation in Coleoptera. *Proc. X Int. Cong. Genetics* 1:444–450.
- Smith, S. G. 1962. Tempero-spatial sequentiality of chromosomal polymorphism in *Chilocorus stigma* Say (Coleoptera: Coccinellidae). *Nature* 193:1210–1211.
- Smith, S. G. 1965. *Chilocorus similis* Rossi (Coleoptera: Coccinellidae): disinterment and case history. *Science* 148:1614–1616.

- Smith, S. G. 1966. Natural hybridization in the coccinellid genus *Chilocorus*. *Chromosoma* 17:379-406.
- Smith, S. G. and S. E. Flanders. 1949. Recent introductions of entomophagus insects into California. *Jour. Econ. Entomol.* 42:995.
- Stehr, W. C. 1930. The Coccinellidae (ladybird beetles) of Minnesota, Univ. Minnesota Agr. Exp. Sta. Bull. 75:5-54.
- Stehr, W. C. 1946. New species of *Scymnus* (Coleoptera: Coccinellidae). *Entomol. Soc. America*. 39:80-81.
- Steinweden, J. B. 1929. Notes on the origin of the wax secretions of certain coccinellid larvae. *Pan-Pacific Entomol.* 6:26-32..
- Stephens, J. F. 1829. A systematic catalogue of British insects. Part 1. London, 416 pp.
- Stephens, J. F. 1831. Illustrations of British entomology. Mandibulata, Vol. 4:1-366. London.
- Stephens, J. F. 1832. Illustrations of British entomology. Mandibulata, Vol. 4:367-413. London.
- Tassan, R. L., K. S. Hagen and D. V. Cassidy. 1982. Imported natural enemies established against ice plant scales in California. *California Agr.* 36:16-17.
- Taylor, T. H. C. 1935. The campaign against *Aspidiotus destructor* Sign., in Fiji. *Bull. Entomol. Res.* 26:1-102.
- Tedders, W. L. and G. W. Angalet. 1981. Colonization of *Coccinella septempunctata* (L.) in Georgia. *Jour. Georgia Entomol. Soc.* 16:47-53.
- Thomson, C. G. 1866. Skandinaviens Coleoptera, synoptiske bearbetade. Vol. 8. Lund, 409 pp.
- Thunberg, C. P. 1781. *Dissertatio entomologica novae insectorum species sistens*. Part 1. Ekelund, pp. 1-28.
- Thunberg, C. P. 1794. *Dissertatio entomologica sistens Insecta Suecica*. 5:63-72. Upsaliae.
- Thunberg, C. P. 1795. *Dissertatio entomologica sistens Insecta Suecica*. 9:105-113. Upsaliae.
- Thunberg, C. P. 1808. *In: Schoenherr, Synonymia Insectorum oder: Versuch einer Synonymie aller Bisher Bekannten Insecten, nach Fabricii Systema Eleutheratorum c. Geordnet*. Vol. 1, Part 2, 424 pp.
- Timberlake, P. H. 1919. Notes on the American species of *Hippodamia* (Coleoptera). *Jour. New York Entomol. Soc.* 27:162-174.
- Timberlake, P. H. 1920a. Revision of the parasitic chalcidoid flies of the genera *Homolotylus* Mayr and *Isodromus* Howard, with descriptions of two closely related genera. *Proc. United States Nat. Museum* 56:133-194.
- Timberlake, P. H. 1920b. Correction of two generic names in Coleoptera and Hymenoptera. *Canadian Entomol.* 52:96.
- Timberlake, P. H. 1927. Biological control of insect pests in the Hawaiian Islands. *Proc. Hawaiian Entomol. Soc.* 6:529-556.
- Timberlake, P. H. 1939. A new species of *Hippodamia* from Mt. Rainier (Coleoptera: Coccinellae). *Proc. Hawaiian Entomol. Soc.* 10:265-266.
- Timberlake, P. H. 1943. The Coccinellidae or ladybeetles of the Koebele collection. Part 1. *Bull. Exp. Sta., Hawaiian Sugar Planters' Assoc., Entomol. Ser.* 22:1-67/1.
- USDA. 1974. European alfalfa beetle in the U.S. *Coop. Ins. Rpt.* 24:731-734.
- USDA. 1975. Distribution of European alfalfa beetle, *Subcoccinella vigintiquatuorpunctata*. *Coop. Ins. Rpt.* 25:184.
- Van den Bosch, R. 1978. Colonization of beneficial organisms in California, 1977. *Div. Biol. Cont., Dept. Entomol. Sci., Univ. Calif., Albany* (unpubl. report).
- Watson, W. Y. 1954. Two new species of Coccinellidae (Coleoptera). *Canadian Entomol.* 86(1):45-47.
- Watson, W. Y. 1956. A study of the phylogeny of the genera of the tribe Coccinellini (Coleoptera). *Cont. Roy. Ontario Mus. Div. Zool. Palaeo.* 42:1-52.

- Watson, W. Y. 1960. Two new species of the genus *Hyperaspis* (Coleoptera: Coccinellidae). Canadian Entomol. 92:230-234.
- Watson, W. Y. 1969. Three new species of *Hyperaspis* from eastern North America (Coleoptera: Coccinellidae). Michigan Entomol. 1:366-370.
- Watson, W. Y. 1976. A review of the genus *Anatis* Mulsant (Coleoptera: Coccinellidae). Canadian Entomol. 108:935-944.
- Watson, W. Y. 1979. North American distribution of *Coccinella u. undecimpunctata* L. (Coleoptera: Coccinellidae). Coleopterists Bull. 33:85-86.
- Weber, F. 1801. Observations Entomologicae, Continentes Novorum quae Condidit Generum Characteres, et Nuper Detectarum Specierum Descriptiones. Kiliae, 116 pp.
- Weed, C. M. 1889. On the predatory stages of the 20-spotted lady-bird (*Psyllobora 20-maculata* Say). Bull. Ohio Agr. Exp. Sta. Technical Series 1:1-4.
- Weise, J. 1879. Bestimmungs-Tabellen der Europäischen Coleopteren. II. Coccinellidae. Zeit. Entomol. Breslav 7:88-159.
- Weise, J. 1885a. Bestimmungs-Tabellen der Europäischen Coleopteren. II. Heft. Coccinellidae. II. Auflage mit Berücksichtigung der Arten aus dem Nordlichen Asien. Mdling, 83 pp.
- Weise, J. 1885b. Beschreibung einiger Coccinelliden. Stettiner. Entomol. Zeit. 46:227-241.
- Weise, J. 1891. Neue Coccinelliden. Deutsche Entomol. Zeit. 4:282-288.
- Weise, J. 1892. Coccinellidae d'Europe et du nord de l'Asie. L'Abeille 28:1-84.
- Weise, J. 1893. Nouvelle répartition des tribus et des genres de Coccinellides Paléarctiques. L'Abeille 28:105-108.
- Weise, J. 1895a. Neue Coccinelliden, sowie Bemerkungen zu bekannten Arten. Ann. Soc. Entomol. Belgique 39:120-146.
- Weise, J. 1895b. über die mit *Novius* Muls. Verwandten Gattungen. Ann. Soc. Entomol. Belgique 39:147-150.
- Weise, J. 1898a. Coccinelliden aus Kamerun. Deutsche Entomol. Zeit. 1898:97-125.
- Weise, J. 1898b. Coccinelliden aus Usambara 2. Ann. Soc. Entomol. Belgique 42:191-201.
- Weise, J. 1898c. Ueber bekannte und neue Coccinelliden. Arch. Naturg. 1:225-238.
- Weise, J. 1899a. Coccinelliden aus Süd-Amerika. Deutsche Entomol. Zeit. 1899:257-272.
- Weise, J. 1899b. Bemerkungen zu den neuesten bearbeitungen der Coccinelliden. Deutsche Entomol. Zeit. 1899:369-378.
- Weise, J. 1901. Coccinelliden aus Ceylon gesammelt von Dr. Horn. Deutsche Entomol. Zeit. 44:417-448 (1900).
- Weise, J. 1904. Synonymische Bemerkungen zu Gorham, Biologia Centrali-Americana. Vol. VII. Coccinellidae. Deutsche Entomol. Zeit. 1904:357-364.
- Weise, J. 1905. Ueber Coccinelliden. Deutsche Entomol. Zeit. 1905:217-220.
- Weise, J. 1906. Synonymische Bemerkungen. Deutsche Entomol. Zeit. 1906:34.
- Weise, J. 1923. Results of Dr. E. Mjöberg's Swedish scientific expeditions to Australia 1910-1913. 31. Chrysomeliden und Coccinelliden aus Queensland. Ark. Zool. Svenska Vetensk. 15:1-150.
- Weise, J. 1929. Ergebnisse einer zoologischen Forschungsreise nach Westindien von Prof. W. Küenthal und Dr. R. Hartmyer im Jahre 1907. Westindische Chrysomeliden und Coccinelliden. Zool. Jahrb., Supplement 16, pp. 11-34.
- Westcott, O. S. 1912. Notes on *Anatis 15-punctata* and *A. caseyi* n. sp. Entomol. News 23:422.
- Westwood, J. O. 1839. An Introduction to the Modern Classification of Insects, Founded on the Natural Habits and Corresponding Organization of the Different Families. Vol. 1. London, 462 pp.
- Wheeler, A. G., Jr. and T. J. Henry. 1981. Seasonal history and habits of the European alfalfa

- beetle, *Subcoccinella vigintiquatuorpunctata* (L.) (Coleoptera: Coccinellidae). Coleopterists Bull. 35:197-203.
- Wheeler, A. G. and E. R. Hoebeke. 1981. A revised distribution of *Coccinella undecimpunctata* L. in eastern and western North America (Coleoptera: Coccinellidae). Coleopterists Bull. 35:213-216.
- Wheeler, W. M. 1911. An ant-nest coccinellid (*Brachyacantha quadripunctata* Mels.). Jour. New York Entomol. Soc. 19:169-174.
- Whitehead, D. R. and R. M. Duffield. 1982. An unusual specialized predator prey association (Coleoptera: Coccinellidae, Chrysomelidae): failure of a chemical defense and possible practical application. Coleopterists Bull. 36:96-97.
- Whitehead, V. B. The validity of the higher taxonomic categories of the tribe Scymnini (Coleoptera: Coccinellidae). Unpubl. thesis, Graduate Division of the University of California, Berkeley, 312 pp.
- Wickham, H. F. 1894. The Coleoptera of Canada. V. Canadian Entomol. 26:297-306.
- Wickham, H. F. 1905. New species of Coleoptera from the western United States II. Canadian Entomol. 37:165-171.
- Wilson, J. W. 1927. The male genital tube of some of the species of the genus *Scymnus* (Coleoptera, Fam. Coccinellidae). Psyche 34:167-170.
- Wingo, C. W. 1952. The Coccinellidae (Coleoptera) of the upper Mississippi Basin. Iowa State Jour. Sci. 27:15-53.
- Woglum, R. S. 1913. Report of a trip to India and the Orient in search of the natural enemies of the citrus whitefly. United States Dept. Agr. Bur. Entomol. Bull. 120:2-58.
- Wolcott, G. N. 1950. The insects of Puerto Rico. Coleoptera. Jour. Agr. Univ. Puerto Rico 32:225-416.
- Woodruff, R. E. and R. I. Sailer. 1977. Establishment of the genus *Azya* in the United States (Coleoptera: Coccinellidae). Florida Dept. Agr. Entomol. Circ. 176:1-2.
- Zetterstedt, J. W. 1838. Insecta Lapponica Descripta. Coleoptera. Lipsiae, pp. 7-240.

Index to family-group and genus-group names

Names in *italics* are synonyms; **boldface** page numbers indicate page on which each taxon is described.

Adalia	681, 776
Anatis	681, 752
<i>Anisocalvia</i>	774
Anisostica	682 , 681
Anovia	665, 667
Aphidecta	681, 839
Arawana	619 , 603
Axion	603, 611
Azya	674
Azyini	655, 671
Blaisdelliana	353
Brachiacantha	353, 556
Brumoides	603
Calvia	681, 774
Cephaloscymnini	36, 66
Cephaloscymnus	68
Ceratomegilla	681, 702
Chilocorinae	34, 602
Chilocorini	602
Chilocorus	602, 641
<i>Cleis</i>	843
Coccidophilus	37, 44
Coccidula	655, 656
Coccidulinae	34, 654
Coccidulini	655
Coccinella	682, 783
Coccinellidae	33
Coccinellinae	678
Coccinellini	679
Coelophora	829 , 681
Coleomegilla	696 , 681
Cryptognatha	600
Cryptognathini	74, 599
Cryptolaemus	100, 105
<i>Cryptoweisea</i>	44
Cycloneda	682, 819
Delphastus	61
Depressoscymnus	287, 314
Didion	107 , 102
Diomus	315 , 102
<i>Dobzhanskia</i>	783
Eocaria	774
Epilachna	864
Epilachninae	34, 862
Epilachnini	863
<i>Epismilia</i>	37

Exochomus	603, 621
Exoplectra	668
Exoplectrini	655, 668
Gnathoweisea	36, 49
Halmus	640 , 603
Harmonia	681, 832
Helesius	353, 396
Hippodamia	681, 706
Hyperaspidius	353, 357
Hyperaspini	74, 352
Hyperaspis	353, 401
<i>Leis</i>	832
<i>Lindorus</i>	659
Macronaemia	686 , 681
Microweisea	37
Microweisini	36
Mulsantina	681, 843
<i>Mysia</i>	763
Myzia	763 , 681
Naemia	693 , 681
Neoharmonia	682, 834
<i>Neomysia</i>	763
Nephaspis	100, 102
<i>Nephopullus</i>	88
Nephus	102, 286 , 287
Nipus	36, 56
Noviini	655, 662
Olla	682, 826
<i>Oxynychus</i>	402
<i>Paramysia</i>	764
Paranaemia	689 , 681
Pentilia	23
Propylaea	682, 817
Pseudoazya	674, 677
<i>Pseudocleis</i>	843
Pseudoscymnus	24
<i>Pseudoweisea</i>	37
Psyllobora	852
Psylloborini	679, 851
Pullus	115, 139
Rhyzobius	655, 659
Rodolia	665
<i>Scymnillus</i>	75
Scymninae	34, 74
Scymnini	74, 99
Scymnobioides	296 , 287
Scymnus	113 , 115, 102
Selvadiini	74, 347
Selvadius	347
Serangiini	36, 58
Sidis	287, 291

<i>Smilia</i>	37
<i>Spiladelpha</i>	704
<i>Spilota</i>	783
Stethorini	74, 88
Stethorus	88
Sticholotidinae	34, 34
Subcoccinella	864, 871
Thalassa	353, 400
<i>Thea</i>	852
Turboscymnus	287, 293
Zagloba	75, 81
Zilini	74
Zilus	75

Index to species-group names

Names in *italics* are synonyms; **boldface** page numbers indicate page on which each taxon is described.

abbreviatus LeConte (Scymnus)	141, 246
<i>abdominalis</i> Say (Olla)	826
<i>adulans</i> Casey (Diomus)	325
<i>advena</i> Casey (Scymnus)	266
<i>aeger</i> Casey (Diomus)	347
aemulator Casey (Hyperaspis)	407, 463
aeneipennis (Sicard) (Zagloba)	28
aethiops (Bland) (Exochomus)	623, 631
affinis Crotch (Cryptolaemus)	17
<i>affinis</i> Randall (Hyperaspis)	423
<i>agricola</i> Casey (Scymnus)	274
<i>albertana</i> Casey (Hippodamia)	715
albifrons (Say) (Brachiacantha)	560, 561, 594
algononus, n. sp. (Hyperaspidius)	359, 385
alta Brown (Coccinella)	786, 804
<i>alutaceum</i> Casey (Axion)	619
<i>aluticollis</i> Casey (Scymnus)	122
amabilis (LeConte) (Diomus)	318, 321
ambigua LeConte (Hippodamia)	708, 729
americana Crotch (Hippodamia)	707, 712
americanus Mulsant (Scymnus)	119, 131
<i>amnicola</i> Wingo (Nephaspis)	102
<i>amoena</i> Scott (Hippodamia)	725
ampla (Mulsant) (Neoharmonia)	837
andrewsi, n. sp. (Hyperaspidius)	359, 392
angolensis Crotch (Chilocorus)	15
<i>angustula</i> Casey (Hyperaspis)	516
angustus Casey (Scymnus)	25
<i>annectans</i> Crotch (Adalia)	782
annexa LeConte (Hyperaspis)	410, 524
antipodum (White) (Harmonia)	19
<i>apacheanus</i> Casey (Scymnus)	220
apetzi Mulsant (Scymnus)	25

<i>apicalis</i> Casey (Hippodamia)	708, 719
<i>apicanus</i> J. Chapin (Scymnus)	119, 133
<i>apiciventris</i> Casey (Scymnus)	169
<i>apithanus</i> Gordon (Scymnus)	147, 188
<i>appalacheus</i> Casey (Diomus)	343
<i>aquilonarius</i> Gordon (Scymnus)	150, 262
<i>arctica</i> (Schneider) (Hippodamia)	707, 725
<i>arcuatus</i> (LeConte) (Hyperaspidius)	358, 360, 369
<i>ardelio</i> Horn (Scymnus)	145, 220 , 148, 150
<i>aridoides</i> Gordon (Scymnus)	147, 226
<i>aridus</i> Casey (Scymnus)	224 , 144, 145, 148, 150
<i>arizonae</i> Casey (Olla)	828
<i>arizonica</i> (Casey) (Arawana)	620
<i>arizonica</i> Dobzhansky (Hyperaspis)	412, 525
<i>arizonica</i> Schaeffer (Brachiacantha)	559, 585
<i>arizonicus</i> Gordon (Diomus)	317, 344
<i>asphaltina</i> Casey (Hyperaspidius)	378
<i>aterrima</i> Casey (Hyperaspis)	504
<i>aterrimus</i> (Horn) (Zilus)	76
<i>atlantica</i> Dobzhansky (Hyperaspis)	488
<i>atomus</i> Casey (Stethorus)	90
<i>atramentarius</i> (Boheman) (Nephus)	296, 304
<i>atronitens</i> (Casey) (Coccidophilus)	45, 47
<i>aurantii</i> Blackburn (Rhizophis)	24
<i>australasiae</i> (Boisduval) (Paraprius)	23
<i>australasiae</i> Blackburn (Scymnus)	25
<i>australis</i> Gordon (Cephaloscymnus)	68, 70
<i>austrinus</i> Gordon (Diomus)	334 , 317
<i>axyridis</i> (Pallas) (Harmonia)	19
<i>balteatus</i> (LeConte) (Diomus)	317, 319
<i>barberi</i> Gordon (Scymnus)	206 , 145, 148
<i>barberi</i> , n. sp. (Brachiacantha)	559, 572
<i>barda</i> LeConte (Coccinella)	789
<i>barovskii</i> S. & D. (Ceratomegilla)	704
<i>barri</i> Hatch (Hyperaspis)	505
<i>basalis</i> Melsheimer (Brachiacantha)	591
<i>bellus</i> (Blackburn) (Rodolia)	25
<i>bensonica</i> Casey (Hyperaspis)	413, 502
<i>bicentralis</i> Casey (Hyperaspis)	432
<i>bicolor</i> Casey (Zagloba)	85 , 83
<i>bicolor</i> Kamiya (Sukunahikona)	28
<i>bigeminata</i> (Randall) (Hyperaspis)	407, 440
<i>bigemmeus</i> (Horn) (Diomus)	332 , 317
<i>bilunulatus</i> (Boisduval) (Prius)	24
<i>binaevatus</i> (Mulsant) (Nephus)	31, 22, 292
<i>binaria</i> Casey (Hyperaspis)	409, 411, 498
<i>binotata</i> (Say) (Hyperaspis)	409, 423
<i>bioculatus</i> Mulsant (Nephus)	297
<i>biornatus</i> Nunenmacher (Hyperaspis)	469
<i>biplagiata</i> (Swartz) (Lemnia)	21
<i>biplagiatus</i> Casey (Nipus)	56

<i>bipunctata</i> (L.) (<i>Adalia</i>)	780
<i>bipunctata</i> Malkin (<i>Hyperaspis</i>)	509
<i>bipunctatus</i> Kugelann (<i>Nephus</i>)	23
<i>bipustulatus</i> (L.) (<i>Chilocorus</i>)	13, 15, 644, 653
<i>hisignatus</i> Horn (<i>Nephus</i>)	294
<i>bitriangularis</i> (Say) (<i>Anisosticta</i>)	683
<i>bivulnerus</i> (Horn) (<i>Nephus</i>)	296, 299
<i>bivulnerus</i> Mulsant (<i>Chilocorus</i>)	651
<i>blaisdelli</i> Casey (<i>Scymnus</i>)	200
<i>blaisdelli</i> Nunenmacher (<i>Brachiacantha</i>)	558, 568
<i>blanchardi</i> Johnson (<i>Mulsantina</i>)	845
<i>blatchleyi</i> , n. name (<i>Hyperaspis</i>)	358, 376
<i>blumi</i> (Nunenmacher) (<i>Brumoides</i>)	603, 611
<i>bollii</i> Crotch (<i>Brachiacantha</i>)	560, 590
<i>bolteri</i> LeConte (<i>Hyperaspis</i>)	410, 554
<i>borealis</i> (F.) (<i>Epilachna</i>)	866, 865
<i>borealis</i> Casey (<i>Psyllobora</i>)	853, 858
<i>borealis</i> Dobzhansky (<i>Hyperaspis</i>)	410, 412, 412, 412, 540
<i>borealis</i> Gordon (<i>Scymnus</i>)	134
<i>borealis</i> Hatch (<i>Scymnus</i>)	194
<i>borealis</i> Timberlake (<i>Anisosticta</i>)	683, 684
<i>bowditchi</i> Johnson (<i>Hippodamia</i>)	708, 739
<i>breiti</i> Mader (<i>Harmonia</i>)	19
<i>brevis</i> Casey (<i>Stethorus</i>)	96
<i>bridwelli</i> Nunenmacher (<i>Coccinella</i>)	785, 804
<i>brullei</i> (<i>Scymnus</i>)	143, 283, 141, 142, 144
<i>brunnescens</i> Casey (<i>Diomus</i>)	343
<i>brunnescens</i> Dobzhansky (<i>Hyperaspis</i>)	410, 544
<i>bryanti</i> Gordon (<i>Scymnus</i>)	278, 148
<i>bryanti</i> Nunenmacher (<i>Hyperaspis</i>)	360, 373
<i>cacti</i> (L.) (<i>Chilocorus</i>)	646, 644
<i>caecus</i> Blackburn (<i>Rhyzobius</i>)	24
<i>caffer</i> Gordon (<i>Scymnus</i>)	151, 146
<i>calaveras</i> Casey (<i>Scymnus</i>)	144, 147, 149, 209
<i>californica</i> Dobzhansky (<i>Hyperaspis</i>)	420
<i>californica</i> Mannerheim (<i>Coccinella</i>)	786, 793
<i>californicus</i> Boheman (<i>Scymnus</i>)	193
<i>californicus</i> Casey (<i>Exochomus</i>)	624, 634
<i>canadensis</i> Dobzhansky (<i>Hyperaspis</i>)	541
<i>canterius</i> Casey (<i>Scymnus</i>)	176
<i>cardinalis</i> (Mulsant) (<i>Rodolia</i>)	32, 25, 666
<i>carolina</i> (Casey) (<i>Brachiacantha</i>)	593
<i>carri</i> Gordon (<i>Scymnus</i>)	234, 149
<i>carri</i> Nunenmacher (<i>Hyperaspis</i>)	362
<i>caseyi</i> Gordon and Chapin (<i>Stethorus</i>)	90
<i>caseyi</i> Johnson (<i>Hippodamia</i>)	708, 743
<i>caseyi</i> Timberlake (<i>Myzia</i>)	769
<i>caseyi</i> Weise (<i>Diomus</i>)	343
<i>caseyi</i> Westcott (<i>Anatis</i>)	755
<i>caseyi</i> , n. sp. (<i>Hyperaspis</i>)	411, 493
<i>caseyanus</i> Leng and Mutchler (<i>Diomus</i>)	343

<i>catalinae</i> (Horn) (<i>Delphastus</i>)	62, 63
<i>caudalis</i> LeConte (<i>Scymnus</i>)	142, 145, 272
<i>caurinus</i> Horn (<i>Scymnus</i>)	121, 118
<i>centralis</i> Casey (<i>Neoharmonia</i>)	837
<i>centralis plagiata</i> Dobzhansky (<i>Hyperaspis</i>)	426
<i>cervicalis</i> Mulsant (<i>Scymnus</i>)	141, 143, 146, 174
<i>chalybeus</i> (Boisduval) (<i>Halmus</i>)	31, 19, 641
<i>chapini</i> Dobzhansky (<i>Hyperaspis</i>)	407, 458
<i>chapini</i> Kapur (<i>Catana</i>)	15
<i>childreni</i> Mulsant (<i>Exochomus</i>)	624, 626
<i>chromopyga</i> Casey (<i>Scymnus</i>)	175
<i>cincta</i> LeConte (<i>Hyperaspis</i>)	411, 492
<i>cinctus</i> LeConte (<i>Scymnus</i>)	191
<i>circularis</i> Sharp (<i>Rhyzobius</i>)	661
<i>circumdatus</i> (Schoenherr) (<i>Chilocorus</i>)	15
<i>circumspectus</i> Horn (<i>Scymnus</i>)	116, 128
<i>citricola</i> Brethes (<i>Coccidophilus</i>)	16
<i>coccidivora</i> (Ashmead) (<i>Microweisea</i>)	38, 42
<i>coccinea</i> Casey (<i>Hippodamia</i>)	727
<i>coccivora</i> Ramakrishna (<i>Scymnus</i>)	26
<i>cockerelli</i> Casey (<i>Scymnus</i>)	145, 147, 148, 232
<i>cockerelli</i> Johnson (<i>Hippodamia</i>)	747
<i>coeruleus</i> Mulsant (<i>Curinus</i>)	17
<i>collaris</i> Melsheimer (<i>Scymnus</i>)	207
<i>coloradana</i> Casey (<i>Hyperaspis</i>)	511
<i>coloradensis</i> Horn (<i>Nephus</i>)	301
<i>coloradensis</i> Nunenmacher (<i>Hyperaspidium</i>)	362
<i>compar</i> Casey (<i>Scymnus</i>)	240, 140
<i>comparatus</i> Casey (<i>Hyperaspidium</i>)	360
<i>complex</i> Casey (<i>Hippodamia</i>)	751
<i>concaus</i> Watson (<i>Hyperaspis</i>)	409, 445
<i>concinata</i> Melsheimer (<i>Mulsantina</i>)	844
<i>concurrents</i> Casey (<i>Hyperaspis</i>)	484
<i>conformis</i> (Boisduval) (<i>Harmonia</i>)	20
<i>confusa</i> Mulsant (<i>Brachiacantha</i>)	591
<i>confusor</i> Casey (<i>Chilocorus</i>)	646
<i>congeminata</i> Watson (<i>Hyperaspis</i>)	444
<i>conglobata</i> (L.) (<i>Oenopia</i>)	23
<i>conglomerata</i> (L.) (<i>Adalia</i>)	14
<i>congressis</i> Watson (<i>Hyperaspis</i>)	437
<i>congruens</i> Casey (<i>Brachiacantha</i>)	580
<i>coniferarum</i> Crotch (<i>Scymnus</i>)	142, 145, 148, 151
<i>connectens</i> (Thunberg) (<i>Hyperaspis</i>)	409, 473
<i>connexa</i> Mulsant (<i>Eriopis</i>)	18
<i>consimilis</i> LeConte (<i>Hyperaspis</i>)	410, 541
<i>consobrinus</i> LeConte (<i>Scymnus</i>)	142, 228
<i>conspirans</i> Casey (<i>Hyperaspis</i>)	407, 479
<i>conspiratus</i> Casey (<i>Hyperaspidium</i>)	366
<i>contexta</i> Mulsant (<i>Mulsantina</i>)	844
<i>convergens</i> Guerin (<i>Hippodamia</i>)	709, 741
<i>conviva</i> Casey (<i>Hyperaspis</i>)	408, 409, 437

<i>coosi</i> Hatch (Scymnus)	120, 117
<i>corrupta</i> Mulsant (Epilachna)	866
<i>cottlei</i> Nunenmacher (Hippodamia)	715
<i>creperus</i> Mulsant (Scymnus)	142, 145, 147, 276
<i>crotchii</i> Casey (Hippodamia)	707, 709, 750
<i>cruenta</i> LeConte (Hyperaspis)	409, 485
<i>cruentoides</i> Dobzhansky (Hyperaspis)	499
<i>cultratus</i> Wingo (Scymnus)	269
<i>cuprea</i> Cockerell (Epilachna)	867
<i>cyanoptera</i> Mulsant (Neoharmonia)	837
<i>cyathigera</i> (Gorham) (Mulsantina)	844, 850
<i>davisi</i> (Leng) (Brumoides)	608 , 603
<i>debilis</i> (LeConte) (Diomus)	317, 347
<i>debilis</i> Blackburn (Rhyzobius)	24
<i>decempustulata</i> (Melsheimer) (Brachiacantha)	560, 579
<i>decepta</i> Blatchley (Naemia)	694
<i>decipiens</i> Casey (Scymnus)	220
<i>decora</i> Casey (Brachiacantha)	558, 559, 561
<i>deficiens</i> Casey (Psyllobora)	858
<i>deludens</i> , n. sp. (Hyperaspis)	407, 460
<i>dentipes</i> (F.) (Brachiacantha)	558, 559, 564
<i>dentipes</i> Fall (Scymnus)	183
<i>desertorum</i> (Casey) (Brumoides)	604
<i>desertorum</i> Casey (Scymnus)	194
<i>difficilis</i> Casey (Scymnus)	116, 120
<i>difficilis</i> Crotch (Coccinella)	786, 804
<i>dimidiata</i> (F.) (Harmonia)	834 , 20, 31
<i>discoideus</i> Crotch (Chilocorus)	15
<i>disconotata</i> Mulsant (Hyperaspis)	410, 532
<i>discreta</i> LeConte (Hyperaspis)	534
<i>disjuncta</i> Timberlake (Hippodamia)	750
<i>disjunctus</i> Casey (Hyperaspis)	556
<i>dispar</i> Casey (Hippodamia)	746
<i>disrupta</i> Dobzhansky (Hyperaspis)	413, 507
<i>dissimila</i> Blatchley (Neoharmonia)	837
<i>dissoluta</i> Crotch (Hyperaspis)	411, 511
<i>distigma</i> Klug (Chilocorus)	15
<i>diversa</i> Mulsant (Brachiacantha)	591
<i>dobzhanskyi</i> Chapin (Hippodamia)	708, 722
<i>dobzhanskyi</i> , n. sp. (Hyperaspis)	409, 476
<i>dorsalis</i> Blackburn (Rhyzobius)	24
<i>dulcis</i> Casey (Diomus)	321
<i>durangoensis</i> Casey (Hyperaspis)	556
<i>effeta</i> Casey (Hyperaspis)	526
<i>elali</i> Nutting (Hyperaspis)	540
<i>elegans</i> Mulsant (Hyperaspis)	536
<i>eleutheræ</i> (Casey) (Zilus)	76, 79
<i>elliptica</i> Casey (Hyperaspis)	516
<i>elusivus</i> Gordon (Scymnus)	252 , 149
<i>emarginata</i> Chapin (Telsimia)	28
<i>emertoni</i> Casey (Diomus)	323

<i>enochrus</i> Gordon (Scymnus)	177, 143, 146
<i>ephippiata</i> Zetterstedt (Coccinella)	786, 792
<i>episcopalis</i> (Kirby) (Macronaemia)	687
<i>erythronotum</i> Gordon (Scymnus)	149, 222
<i>esclavium</i> Dobzhansky (Hyperaspis)	406, 407, 468
<i>essigi</i> Malkin (Hyperaspis)	516
<i>eucharis</i> (Mulsant) (Harmonia)	20
<i>eugenii</i> Mulsant (Coccinella)	787, 789
<i>excelsa</i> Fall (Hyperaspis)	453, 406
<i>exiguus</i> Weise (Pharoscymnus)	23
<i>expurgata</i> Casey (Hippodamia)	708, 723
<i>extensa</i> Mulsant (Hippodamia)	708, 735
<i>extricatus</i> Casey (Scymnus)	203
<i>falcigera</i> Crotch (Hippodamia)	707, 713
<i>falli</i> Gordon (Scymnus)	199, 148
<i>falli</i> Nunenmacher (Hyperaspis)	504
<i>fasciatus</i> Casey (Exochomus)	624, 628
<i>fastidiosa</i> Casey (Hyperaspis)	406, 480
<i>fattigi</i> Blatchley (Neoharmonia)	837
<i>felina</i> (F.) (Brachiacantha)	560, 577
<i>felschei</i> (Weise) (Microweisea)	43
<i>femoralis</i> LeConte (Diomus)	338
<i>fenderi</i> Malkin (Scymnus)	121, 117
<i>fenestralis</i> Casey (Olla)	828
<i>fenyesi</i> Leng (Brachiacantha)	582
<i>ferox</i> , n. sp. (Gnathoweisea)	49, 55
<i>festatus</i> Wingo (Scymnus)	180, 141
<i>fidelis</i> Casey (Hyperaspis)	521
<i>filiola</i> Casey (Hyperaspis)	413, 498
<i>fimbriolata</i> Melsheimer (Hyperaspis)	411, 488
<i>flammula</i> Nunenmacher (Hyperaspis)	450
<i>flava</i> timberlake (Cycloneda)	825
<i>flavescens</i> (Motschulsky) (Serangium)	27
<i>flavescens</i> Casey (Scymnus)	143, 146, 155
<i>flavifrons</i> (Melsheimer) (Nephus)	296
<i>flavifrons</i> Blackburn (Diomus)	336
<i>flavifrons</i> Mulsant (Brachiacantha)	560, 592
<i>flavipes</i> (Thunberg) (Exochomus)	30, 18, 639, 623
<i>flavocephalus</i> Blatchley (Hyperaspis)	358, 375
<i>flavomaculata</i> (DeGeer) (Liadalia)	21
<i>flebilis</i> Horn (Scymnus)	192
<i>floralis</i> (Motschulsky) (Exochomus)	18
<i>floridana</i> Leng (Coleomegilla)	700
<i>floridanus</i> (Mulsant) (Diomus)	318, 320
<i>floridensis</i> Blatchley (Brachiacantha)	560, 589
<i>fontinalis</i> Casey (Hippodamia)	750
<i>forestieri</i> (Mulsant) (Rhizophobius)	32, 24, 660, 661
<i>franciscana</i> Mulsant (Coccinella)	798
<i>fraternus</i> LeConte (Chilocorus)	644, 649
<i>fraternus</i> LeConte (Scymnus)	142, 144, 183
<i>frigida</i> Schneider (Adalia)	780

<i>frosti</i> Casey (Nephus)	289
<i>fugax</i> Blackburn (Rhyzobius)	24
<i>fulgida</i> Watson (Coccinella)	786, 807
<i>fulvopustulata</i> Melsheimer (Brachiacantha)	577
<i>fuscilabris</i> (Mulsant) (Coleomegilla)	698, 700
<i>galbula</i> (Mulsant) (Ileis)	21
<i>garlandicus</i> Casey (Scymnus)	145, 147, 148, 202
<i>gemellata</i> Mulsant (Cryptognatha)	17
<i>gemina</i> LeConte (Hyperaspis)	407, 438
<i>gemma</i> Casey (Hyperaspis)	478, 407
<i>georgei</i> (Weise) (Nephus)	295
<i>gilae</i> Casey (Scymnus)	169, 147, 149
<i>gilvifrons</i> (Mulsant) (Stethorus)	27
<i>glacialis</i> (F.) (Hippodamia)	709, 731
<i>globosa</i> Casey (Hyperaspis)	20
<i>globula</i> Casey (Hyperaspis)	408, 418
<i>gordoni</i> (Dozier) (Nephus)	314, 296
<i>granum</i> (Gorham) (Stethorus)	27
<i>guexi</i> LeConte (Exochomus)	627, 624
<i>guexi</i> Mulsant (Hyperaspis)	440
<i>guttifera</i> Weise (Hyperaspis)	536
<i>guttiger</i> Mulsant (Nephus)	297
<i>guttulatus</i> (LeConte) (Nephus)	296, 301
<i>haematosticta</i> Fall (Hyperaspis)	408, 425
<i>haemorrhous</i> LeConte (Scymnus)	183
<i>hageni</i> , n. sp. (Gnathowisea)	49, 54
<i>hardyi</i> , n. sp. (Hyperaspidium)	359, 395
<i>harneyi</i> Hatch; (Scymnus)	120
<i>hemorrhous divisus</i> Casey (Scymnus)	284
<i>hemorrhous laurenticus</i> Casey (Scymnus)	284
<i>hemorrhous subaeneus</i> Casey (Scymnus)	284
<i>hercules</i> Belicek (Hyperaspidium)	359, 391
<i>hesperius</i> Gordon (Scymnus)	150, 265
<i>hexacyclus</i> Smith (Chilocorus)	644, 652
<i>hirtuosum</i> Blackburn (Serangium)	27
<i>histrion</i> (Fall) (Brumoides)	603, 610
<i>hogeii</i> (Gorham) (Brumoides)	604, 605
<i>horni</i> Crotch (Myzia)	769
<i>horni</i> Gorham (Scymnus)	216, 147, 149
<i>horni</i> Nunenmacher (Hyperaspidium)	364
<i>horni</i> Weise (Pharoscymnus)	23
<i>horni</i> , n. sp. (Zilus)	77, 76
<i>hortensis</i> Wingo (Scymnus)	277
<i>hottentota</i> Mulsant (Hyperaspis)	519
<i>houstoni</i> Casey (Diomus)	343
<i>howdeni</i> Gordon (Scymnus)	280, 147
<i>huachuca</i> Gordon (Scymnus)	282, 148
<i>hubbardi</i> Gordon (Scymnus)	280, 147
<i>hudsonica</i> (Casey) (Mulsantina)	844, 847
<i>humboldti</i> Casey (Scymnus)	204, 150
<i>humboldtiensis</i> Nunenmacher (Coccinella)	785, 787, 816

<i>humeralis</i> Say (Adalia)	780
<i>humilis</i> Gordon (Diomus)	327, 317
<i>hystrix</i> Casey (Zagloba)	86, 84
<i>iceryae</i> Janson (Rodolia)	25
<i>idae</i> Nunenmacher (Hyperaspis)	450
<i>ignarus</i> Gordon (Scymnus)	212, 148
<i>illustris</i> Casey (Brachiacantha)	561, 595
<i>imitator</i> , n. sp. (Hyperaspis)	413, 551
<i>immaculata</i> F. (Cycloneda)	820
<i>immaculata</i> Hatch (Hyperaspis)	410, 528
<i>immaculatus</i> Hatch (Hyperaspidius)	368
<i>impexus</i> (Mulsant) (Scymnus)	140, 151, 26, 32
<i>impictipennis</i> Weise (Mulsantina)	844
<i>impletus</i> Gordon (Scymnus)	242, 144, 147, 150
<i>impunctus</i> Wingo (Scymnus)	240
<i>inaequalis</i> (F.) (Coelophora)	17, 20, 830
<i>inaequalis</i> Casey (Pharoscyrnus)	23
<i>incompletus</i> Nunenmacher (Axion)	615
<i>indianensis</i> Weise (Scymnus)	117, 126
<i>indubitabilis</i> Crotch (Brachiacantha)	560, 596
<i>indutus</i> Casey (Scymnus)	274
<i>inedita</i> Mulsant (Hyperaspis)	409, 426
<i>infans</i> Casey (Scymnus)	169
<i>inflexa</i> Casey (Hyperaspis)	411, 490
<i>infuscatus</i> Boheman (Scymnus)	119
<i>ingenitus</i> Casey (Hyperaspidius)	359, 387
<i>innocens</i> Casey (Scymnus)	195
<i>innocuus</i> Casey (Scymnus)	268
<i>inops</i> Casey (Scymnus)	310
<i>insignis</i> Casey (Hyperaspidius)	358, 359, 382
<i>insolens</i> Casey (Hyperaspis)	437
<i>insulatus</i> Gordon (Cephaloscyrnus)	69, 72
<i>intermedia</i> (Crotch) (Coccinella)	16
<i>interrogans</i> Mulsant (Hippodamia)	748
<i>interrupta</i> (Casey) (Myzia)	765, 769
<i>interruptus</i> Goeze (Scymnus)	26
<i>intrusoides</i> Hatch (Nephus)	308
<i>intrusus</i> (Horn) (Nephus)	310, 296
<i>iowensis</i> Casey (Scymnus)	207, 142, 145, 145, 150
<i>irregularis</i> Weise (Anisosticta)	683
<i>jacinto</i> Casey (Scymnus)	203
<i>jacobianus</i> Casey (Scymnus)	149, 203
<i>japonica</i> (Crotch) (Hyperaspis)	21
<i>japonica</i> (Thunberg) (Propyleae)	24
<i>jasperensis</i> Belicek (Hyperaspis)	409, 552
<i>jejunus</i> Casey (Stethorus)	27
<i>johnsoni</i> Casey (Coccinella)	786, 793
<i>jovialis</i> Fall (Hyperaspis)	408, 420
<i>jucunda</i> LeConte (Hyperaspis)	446
<i>jucunda</i> Mulsant (Hyperaspis)	21
<i>juliana</i> Mulsant (Coccinella)	788

<i>juncta</i> Casey (Hippodamia)	741
<i>juncta</i> Johnson (Epilachna)	867
<i>juniperus</i> Nunenmacher (Hyperaspidius)	360
<i>kansanus</i> Casey (Scymnus)	162, 141, 143
<i>kincaidi</i> Hatch (Nephus)	290
<i>kingi</i> Macleay (Egleis)	18
<i>kinzeli</i> Casey (Scymnus)	195
<i>kirbyi</i> Crotch (Coccinella)	787, 814
<i>koebelei</i> (Olliff) (Rodolia)	25
<i>koebelei</i> Nunenmacher (Psyllobora)	858
<i>kunzii</i> Schaeffer (Hyperaspis)	415
<i>kuwanae</i> Silvestri (Chilocorus)	15, 13, 644, 652
<i>labiculata</i> (Say) (Anatis)	754, 753
<i>lacustris</i> LeConte (Scymnus)	144, 145, 150, 268
<i>laevipennis</i> Casey (Hyperaspis)	450
<i>laevis</i> Gordon (Cephaloscymnus)	68, 73
<i>lanei</i> Hatch (Hyperaspis)	530
<i>lanosus</i> Blackburn (Erithionyx)	18
<i>lateralis</i> Mulsant (Hyperaspis)	406, 448
<i>laticollis</i> Casey (Zagloba)	84
<i>latiusculus</i> Casey (Exochomus)	627
<i>leachi</i> Nunenmacher (Hyperaspis)	408, 422
<i>lecontei</i> Casey (Anatis)	759, 753
<i>lecontei</i> Crotch (Hyperaspis)	446
<i>lecontei</i> Crotch (Scymnus)	191
<i>lecontei</i> Mulsant (Hippodamia)	708, 709, 733
<i>lengi</i> Johnson (Hippodamia)	719
<i>lengi</i> Nunenmacher (Brachiacantha)	582
<i>lengi</i> Schaeffer (Hyperaspis)	473
<i>lengi</i> Timberlake (Coleomegilla)	698
<i>lepida</i> LeConte (Coccidula)	656
<i>lepida</i> Mulsant (Brachiacantha)	599
<i>leporina</i> Mulsant (Hippodamia)	727
<i>leucopsis</i> Melsheimer (Hyperaspis)	423
<i>levaillanti</i> Mulsant (Scymnus)	26
<i>levrati</i> (Mulsant) (Hyperaspis)	459, 406
<i>lewisi</i> Crotch (Hyperaspis)	407, 448
<i>lichatschovi</i> Hummel (Buleae)	29
<i>liebecki</i> (Horn) (Diomus)	325, 318
<i>liliputana</i> Casey (Hippodamia)	747
<i>limbalis</i> Casey (Hyperaspis)	411, 497
<i>limbata</i> (Motschulsky) (Jauravia)	21
<i>limbifer</i> Casey (Cycloneda)	820, 822
<i>lindi</i> Blackburn (Rhyzobius)	24
<i>linearis</i> Gordon (Scymnus)	136
<i>lineata</i> (Thunberg) (Micraspis)	22
<i>lineola</i> (F.) (Micraspis)	22
<i>litigiosa</i> Mulsant (Naemia)	693, 696
<i>litratus</i> Gorham (Exochomus)	18
<i>lodi</i> Stehr (Scymnus)	284
<i>loewii</i> Mulsant (Scymnus)	140, 143, 146, 148, 189

<i>longicoxitis</i> Nutting (<i>Hyperaspis</i>)	406, 482
<i>longulum</i> Casey (<i>Didion</i>)	111 , 110
<i>lophanthae</i> (Blaisdell) (<i>Rhyzobius</i>)	32, 25, 660
<i>louisianae</i> J. Chapin (<i>Scymnus</i>)	142, 144, 146, 187
<i>luctuosus</i> Casey (<i>Scymnus</i>)	266 , 150
<i>ludovicianus</i> Casey (<i>Nephus</i>)	298
<i>lugubris</i> (Randall) (<i>Hyperaspis</i>)	406, 446
<i>lunaris</i> Weise (<i>Diomus</i>)	332
<i>lunata</i> (F.) (<i>Cheilomenes</i>)	15
<i>lunatomaculata</i> Motschulsky (<i>Hippodamia</i>)	708, 722
<i>luteipes</i> Mulsant (<i>Azya</i>)	14
<i>luteodorsa</i> J. Chapin (<i>Mulsantina</i>)	844, 849
<i>luteopicta</i> Mulsant (<i>Coccinella</i>)	16
<i>mackenziei</i> Chapin (<i>Hippodamia</i>)	734
<i>maculatus</i> Hatch (<i>Nephus</i>)	304
<i>maculifera</i> Melsheimer (<i>Hyperaspis</i>)	536
<i>maculigerum</i> Blackburn (<i>Serangium</i>)	27
<i>maculiventris</i> Bland (<i>Epilachna</i>)	866
<i>maderi</i> (Nunenmacher) (<i>Selvadius</i>)	349, 350
<i>major</i> Dobzhansky (<i>Hyperaspis</i>)	409, 444
<i>majus</i> , n. name (<i>Scymnus</i>)	211 , 142
<i>majusculus</i> Wingo (<i>Scymnus</i>)	211
<i>mali</i> (Say) (<i>Anatis</i>)	762 , 753
<i>maneei</i> Casey (<i>Hyperaspis</i>)	448
<i>mannerheimi</i> Mulsant (<i>Coccinella</i>)	816 , 787
<i>marginata</i> (LeConte) (<i>Coccidophilus</i>)	45, 48
<i>marginatus</i> (Gaines) (<i>Hyperaspidius</i>)	358, 380
<i>marginellus</i> Mulsant (<i>Nephus</i>)	298
<i>marginicollis</i> Mannerheim (<i>Scymnus</i>)	140, 193
<i>marginipennis</i> (LeConte) (<i>Exochomus</i>)	624
<i>martini</i> Gordon (<i>Scymnus</i>)	264 , 150
<i>mckenziei</i> Nutting (<i>Hyperaspis</i>)	408, 472
<i>medialis</i> Casey (<i>Hyperaspis</i>)	407, 462
<i>medionotans</i> Casey (<i>Scymnus</i>)	277
<i>megacephalus</i> (Fall) (<i>Selvadius</i>)	349, 351
<i>melanocephalus</i> Zoubk. (<i>Exochomus</i>)	18
<i>melsheimeri</i> Weise (<i>Scymnus</i>)	207
<i>mendocino</i> Casey (<i>Scymnus</i>)	230 , 149
<i>metallicus</i> Korschefsky (<i>Exochomus</i>)	31, 18, 623, 640
<i>metator</i> Casey (<i>Hyperaspis</i>)	459
<i>microsticta</i> (Casey) (<i>Brachiacantha</i>)	597
<i>micula</i> , n. sp. (<i>Gnathoweisea</i>)	49, 52
<i>militaris</i> (LeConte) (<i>Hyperaspidius</i>)	358, 365
<i>mimoides</i> Gordon (<i>Scymnus</i>)	171 , 148
<i>mimus</i> Casey (<i>Hyperaspidius</i>)	360, 362
<i>mimus</i> Fall (<i>Scymnus</i>)	232
<i>minor</i> Casey (<i>Mulsantina</i>)	845
<i>minor</i> Korschefsky (<i>Diomus</i>)	347
<i>minor</i> Leng (<i>Brachiacantha</i>)	561
<i>minuta</i> (Casey) (<i>Microweisea</i>)	38, 39
<i>minutissimus</i> Casey (<i>Diomus</i>)	347

<i>minutus</i> Blackburn (Cycloscymnus)	17
<i>misella</i> (LeConte) (Microweisea)	38, 40
<i>moerens</i> (LeConte) (Hyperaspis)	546 , 412
<i>moesta</i> LeConte (Hippodamia)	707, 739
<i>molliculus</i> Casey (Diomus)	347
<i>montana</i> Casey (Myzia)	768
<i>montanica</i> Casey (Hyperaspis)	449
<i>montezumae</i> Mulsant (Thalassa)	400
<i>monticola</i> Casey (Scymnus)	213 , 144
<i>monticola</i> Mulsant (Coccinella)	787, 811
<i>montrouzieri</i> Mulsant (Cryptolaemus)	17, 105
<i>morelletti</i> Mulsant (Scymnus)	26
<i>mormon</i> Casey (Scymnus)	218 , 144, 147
<i>mormonicus</i> Casey (Exochomus)	631
<i>mulsanti</i> LeConte (Hippodamia)	727
<i>multiguttata</i> Randall (Anisosticta)	683
<i>munda</i> (Say) (Cycloneda)	823 , 820
<i>myrmidon</i> (Mulsant) (Diomus)	317, 326
<i>nana</i> Mulsant (Pysillobora)	854 , 853
<i>nanellus</i> , n. sp. (Hyperaspis)	358, 374
<i>nanum</i> (LeConte) (Didion)	111 , 110
<i>natchezianus</i> Casey (Scymnus)	272
<i>nebulosus</i> LeConte (Scymnus)	116, 119
<i>neglecta</i> Mulsant (Lotis)	21
<i>nemorivagus</i> Wingo (Scymnus)	141, 182
<i>neomexicanus</i> Gordon (Scymnus)	146, 237
<i>nevadensis</i> (Leng) (Brumoides)	605
<i>nevadensis</i> Weise (Scymnus)	149, 268
<i>nevadica</i> Casey (Hyperaspis)	411, 512
<i>nigellum</i> Blackburn (Cyrema)	17
<i>niger</i> Casey (Nipus)	58 , 56
<i>nigerrima</i> Casey (Lotis)	21
<i>nigricollis</i> Gordon (Scymnus)	146, 161
<i>nigripennis</i> (LeConte) (Helesius)	397
<i>nigripes</i> Kapur (Stethorus)	27
<i>nigrocauda</i> Dobzhansky (Hyperaspis)	450
<i>nigromaculata</i> Nunenmacher (Hippodamia)	720
<i>nigropennis</i> Blatchley (Hyperaspis)	426
<i>nigrosuturalis</i> Blatchley (Hyperaspis)	406, 435
<i>nodiceps</i> Marshall (Cryptognatha)	30, 17, 600
<i>normata</i> Say (Hyperaspis)	423
<i>notans</i> Randall (Myzia)	768
<i>notatula</i> Casey (Hyperaspis)	521
<i>notescens</i> Blackburn (Scymnus)	26
<i>notulata</i> Mulsant (Neoharmonia)	837
<i>novascotiae</i> Chapin (Hyperaspis)	534
<i>novemnotata</i> Herbst (Coccinella)	786, 798
<i>nubes</i> Casey (Scymnus)	192
<i>nubilans</i> Casey (Helesius)	398 , 397
<i>nubilata</i> Casey (Mulsantina)	845
<i>nubilatus</i> (Casey) (Hyperaspis)	378 , 358

<i>nubilis</i> Mulsant (Scymnus)	26
<i>nugator</i> Casey (Scymnus)	143, 146, 235
<i>nummeralis</i> (Boisduval) (Parapriasus)	23
<i>nunenmacheri</i> Casey (Hyperaspis)	411, 514
<i>nunenmacheri</i> Gordon (Selvadius)	349, 351
<i>nupta</i> Casey (Hyperaspis)	511
<i>nuttingi</i> Gordon (Scymnus)	239 , 150
<i>obliqua</i> Casey (Hippodamia)	730
<i>obliterata</i> (L.) (Aphidecta)	14, 13, 840
<i>oblongus</i> Casey (Hyperaspidium)	359, 386
<i>obscura</i> Malkin (Hyperaspis)	540
<i>obsoleta</i> Casey (Psyllobora)	855
<i>occidentalis</i> Dobzhansky (Hyperaspis)	464
<i>occidentalis</i> Horn (Cephaloscymnus)	69, 71
<i>occidentalis</i> Horn (Coccidula)	657
<i>occiduus</i> Casey (Didion)	111
<i>occiduus</i> Gordon (Nipus)	58 , 56
<i>octavia</i> Casey (Hyperaspis)	413, 538
<i>octomaculata</i> (F.) (Harmonia)	20
<i>octonotata</i> Casey (Hyperaspis)	406, 428
<i>oculaticauda</i> Casey (Hyperaspis)	412, 526
<i>oculatus</i> (Blatchley) (Nephaspis)	102
<i>oculifera</i> Casey (Hyperaspis)	408, 457
<i>ohioensis</i> Stehr (Diomus)	325
<i>omissa</i> Casey (Hyperaspis)	450
<i>opaculus</i> Horn (Scymnus)	138 , 117
<i>orbiculatus</i> (Leng) (Brumoides)	605
<i>orbiger</i> Mulsant (Azya)	13, 29, 676
<i>orbipennis</i> Casey (Zagloba)	84
<i>orbus</i> Casey (Chilocorus)	648 , 644
<i>oregona</i> Casey (Coccinella)	798
<i>oregona</i> Casey (Myzia)	772
<i>oregona</i> Dobzhansky (Hyperaspis)	410, 412, 413, 530
<i>oregonensis</i> Crotch (Hippodamia)	709, 746
<i>ornata</i> (Horn) (Zagloba)	84 , 83
<i>ornatella</i> , n. sp. (Hyperaspis)	408, 454
<i>ornatus naviculatus</i> (Casey) (Nephus)	287, 290
<i>ornatus ornatus</i> (LeConte) (Nephus)	287, 289
<i>osculans</i> LeConte (Hyperaspis)	408, 469
<i>ovalis</i> (LeConte) (Microweisea)	38, 43
<i>ovoideus</i> (Casey) (Brumoides)	604
<i>pacifica</i> Casey (Brachiacantha)	594
<i>pacificus</i> Crotch (Scymnus)	142, 145, 148, 154
<i>pallens</i> LeConte (Scymnus)	166 , 143, 146, 148
<i>pallescens</i> Casey (Hyperaspidium)	360, 372
<i>pallescens</i> Dobzhansky (Hyperaspis)	509
<i>pallidicola</i> Blatchley (Psyllobora)	861
<i>pallidula</i> Dobzhansky (Hyperaspis)	509
<i>pallidus</i> (LeConte) (Delphastus)	62
<i>pallidus</i> Casey (Hyperaspidium)	364
<i>paludicola</i> Schwarz (Hyperaspis)	413, 539

<i>papago</i> Casey (Scymnus)	144, 147, 255
<i>paracanus</i> J. Chapin (Scymnus)	119, 134
<i>parcesetosa</i> (Sicard) (Catana)	15
<i>parenthesis</i> (Say) (Hippodamia)	708, 715
<i>parthenica</i> Meyrick (Coelophora)	17
<i>partitus</i> Casey (Diomus)	338
<i>parva</i> Watson (Ceratomegilla)	704
<i>parviceps</i> Casey (Didion)	111
<i>parvicollis</i> (Casey) (Brumoides)	610
<i>parvinotata</i> Casey (Pysillobora)	853, 861
<i>paspalis</i> Watson (Hyperaspis)	423
<i>pauculus</i> Gordon (Scymnus)	164 , 143, 146
<i>pellio</i> Blatchley (Diomus)	320
<i>peninsularis</i> Gordon (Scymnus)	142, 275
<i>perdistinctus</i> Kapur (Catana)	15
<i>perpallida</i> Dobzhansky (Hyperaspis)	420
<i>perplexa</i> Mulsant (Coccinella)	786, 787
<i>phelpsii</i> Crotch (Scymnus)	120
<i>phosphorus</i> Lewis (Nephus)	23
<i>picta</i> (Randall) (Mulsantina)	844
<i>pilatii</i> Mulsant (Axion)	617
<i>pinachi</i> Gordon and Chapin (Stethorus)	90, 93
<i>pinguis</i> Casey (Hyperaspis)	407, 452
<i>pinorum</i> Casey (Hyperaspis)	426
<i>pistillata</i> Watson (Hyperaspis)	408, 409, 434
<i>plagiata</i> Casey (Olla)	828
<i>plagiata</i> Schaeffer (Pysillobora)	853, 858
<i>plagiatum</i> (Olivier) (Axion)	615, 617
<i>planatus</i> Gordon (Nipus)	58 , 56
<i>planiceps</i> (Casey) (Gnathowisea)	49, 51
<i>pleuralis</i> Casey (Hyperaspis)	410, 411, 504
<i>pleuralis</i> LeConte (Axion)	619
<i>ploribundus</i> (Nunenmacher) (Hyperaspidius)	359, 368
<i>pluto</i> Fall (Hyperaspis)	454 , 406
<i>polita</i> Casey (Cycloneda)	825 , 820
<i>politissima</i> Casey (Hippodamia)	741
<i>postica</i> LeConte (Hyperaspis)	412, 516
<i>postpictus</i> (Scymnus)	143, 146, 149, 194
<i>praetextatus</i> Melsheimer (Exochomus)	624
<i>pratensis</i> LeConte (Hyperaspis)	407, 461
<i>praticola</i> Mulsant (Hippodamia)	741
<i>proba</i> (Say) (Hyperaspis)	414 , 407
<i>prolongata</i> Crotch (Coccinella)	786, 800
<i>protensa</i> Casey (Hyperaspis)	411, 547
<i>pseudapicanus</i> , n. name (Scymnus)	118, 134
<i>pseudotaedatus</i> Gordon (Diomus)	317, 329
<i>psyche</i> Casey (Hyperaspis)	503 , 412
<i>pugetana</i> Casey (Hippodamia)	727
<i>pulchella</i> (Mulsant (Coccinellina)	17
<i>pulcher</i> Blackburn (Rhyzobius)	25
<i>pullata</i> (Say) (Myzia)	767 , 765

<i>pulvinatus</i> Wingo (Scymnus)	140, 181
<i>pumilio</i> Weise (Diomus)	336 , 17, 18, 30, 317
<i>punctata</i> LeConte (Hyperaspis)	413, 549
<i>punctatum</i> (Melsheimer) (Didion)	109, 110
<i>puncticollis</i> (LeConte) (Delphastus)	64
<i>puncticollis</i> Casey (Hippodamia)	747
<i>puncticollis</i> LeConte (Scymnus)	142, 259
<i>punctillum</i> Weise (Stethorus)	33, 27, 29, 90, 96
<i>punctulata</i> LeConte (Hippodamia)	730
<i>punctum</i> picipes Casey (Stethorus)	90, 96
<i>punctum</i> punctum (LeConte) (Stethorus)	90, 95
<i>puritanus</i> Casey (Scymnus)	167
<i>pusillus</i> (LeConte) (Delphastus)	62, 64
<i>pusio</i> Casey (Diomus)	347
<i>pygmaeus</i> Blackburn (Midus)	22
<i>quadraria</i> Casey (Hippodamia)	727
<i>quadrarius</i> (Casey) (Nephus)	296, 305
<i>quadrillum</i> LeConte (Brachiacantha)	559, 569
<i>quadrimaculatus</i> (Blackburn) (Sticholotis)	28
<i>quadrioculata</i> (Motschulsky) (Hyperaspis)	412, 413, 521
<i>quadriplagiatus</i> (Swartz) (Menochilus)	22
<i>quadripunctata</i> (Melsheimer) (Brachiacantha)	560, 591
<i>quadripustulatus</i> (L.) (Exochomus)	31, 19, 624, 636
<i>quadristicta</i> (Telsimia)	28
<i>quadrिताeniatus</i> LeConte (Diomus)	320
<i>quadrivittata</i> LeConte (Hyperaspis)	410, 545
<i>quadrivittatus</i> Mulsant (Scymnus)	26
<i>quatuordecimguttata</i> (L.) (Calvia)	14, 775
<i>quatuordecimpunctata</i> (L.) (Propyleae)	24, 29, 31, 817
<i>querceti</i> Schwarz (Brachiacantha)	559, 588
<i>querquesi</i> Nutting (Hyperaspis)	412, 529
<i>quindecimmaculata</i> Hope (Harmonia)	834
<i>quindecimmaculata</i> Mulsant (Hippodamia)	708, 737
<i>quindecimpunctata</i> Olivier (Anatis)	754, 762
<i>quindecimpilota</i> Hope (Harmonia)	834
<i>quinqesignata</i> (Kirby) (Hippodamia)	708, 709, 727
<i>randalli</i> Casey (Myzia)	768
<i>rathvoni</i> (LeConte) (Anatis)	753, 756
<i>rectus</i> Casey (Selvadius)	350 , 349
<i>regalis</i> Casey (Hyperaspis)	426
<i>reitteri</i> Dodge (Coccidula)	657
<i>renifer</i> Casey (Psyllobora)	853, 862
<i>renoicus</i> Casey (Scymnus)	215 , 144, 149
<i>reversa</i> (Fall) (Coccidophilus)	47
<i>revocans</i> Casey (Hyperaspis)	406, 464
<i>rhesus</i> Casey (Scymnus)	253
<i>richardsoni</i> Brown (Coccinella)	786, 790
<i>rivularis</i> Dobzhansky (Hyperaspis)	409, 417
<i>roseicollis</i> (Mulsant) (Diomus)	317, 341
<i>rossi</i> Nunenmacher (Hyperaspidium)	369
<i>rotunda</i> Casey (Hyperaspis)	409, 475

<i>rotunda</i> , n. sp. (<i>Brachiacantha</i>)	560, 575
<i>rubidus tristis</i> Falderman (<i>Chilocorus</i>)	15
<i>rubricaudus</i> Casey (<i>Scymnus</i>)	141, 143, 175
<i>rubripennis</i> Casey (<i>Cycloneda</i>)	820
<i>rufa</i> Nunenmacher (<i>Neoharmonia</i>)	839
<i>rufescens</i> Dobzhansky (<i>Hyperaspis</i>)	485
<i>ruficollis</i> Blackburn (<i>Rhyzobius</i>)	25
<i>rufomarginata</i> Mulsant (<i>Hyperaspis</i>)	488
<i>rufopilosa</i> Mulsant (<i>Rodolia</i>)	25
<i>rusticus</i> Casey (<i>Scymnus</i>)	126
<i>saginatus</i> Casey (<i>Scymnus</i>)	209
<i>sanctaeritae</i> Dobzhansky (<i>Hyperaspis</i>)	411, 487
<i>sanctus</i> Weise (<i>Scymnus</i>)	220
<i>sanguinea</i> (L.) (<i>Cycloneda</i>)	820
<i>sanguinifer</i> Casey (<i>Nephus</i>)	289
<i>sarpedon</i> Casey (<i>Scymnus</i>)	192
<i>satana</i> , n. sp. (<i>Zagloba</i>)	86, 84
<i>satellus</i> Blackburn (<i>Rhyzobius</i>)	35
<i>saucia</i> Mulsant (<i>Lemnina</i>)	21
<i>sauzeti</i> Mulsant (<i>Oenopia</i>)	23
<i>sayi</i> Crotch (<i>Olla</i>)	826
<i>schaefferi</i> , n. sp. (<i>Exoplectra</i>)	671
<i>schaefferi</i> , n. sp. (<i>Hyperaspis</i>)	411, 496
<i>schuberti</i> Nunenmacher (<i>Nephus</i>)	305
<i>schuhi</i> Hatch (<i>Hyperaspis</i>)	540
<i>schwarzi</i> Gordon (<i>Gnathowisea</i>)	49, 50
<i>schwarzi</i> Gordon (<i>Nephus</i>)	315
<i>schwarzi</i> , n. sp. (<i>Brachiacantha</i>)	559, 585
<i>scitus</i> Casey (<i>Nephus</i>)	302
<i>scotti</i> Dobzhansky (<i>Hyperaspis</i>)	521
<i>scotti</i> Nunenmacher (<i>Scymnus</i>)	192
<i>securus</i> J. Chapin (<i>Scymnus</i>)	141, 285
<i>semilunaris</i> Johnson (<i>Olla</i>)	828
<i>semiruber</i> Horn (<i>Scymnus</i>)	167, 141
<i>senegalensis hottentota</i> Mulsant (<i>Hyperaspis</i>)	31, 21
<i>separata</i> Casey (<i>Hyperaspis</i>)	447
<i>separata</i> Casey (<i>Psyllobora</i>)	856
<i>separata</i> Leng (<i>Brachiacantha</i>)	564
<i>septempunctata</i> L. (<i>Coccinella</i>)	16, 786, 795, 29, 13
<i>septentrionis</i> (Weise) (<i>Brumoides</i>)	604
<i>septentrionis</i> Dobzhansky (<i>Hyperaspis</i>)	480
<i>sequoiae</i> Dobzhansky (<i>Coccinella</i>)	785, 801
<i>serena</i> Casey (<i>Hyperaspis</i>)	490
<i>seriata</i> (Melsheimer) (<i>Naemia</i>)	693, 694
<i>sexmaculatus</i> (F.) (<i>Menochilus</i>)	22
<i>sexualis</i> (Casey) (<i>Blaisdelliana</i>)	355
<i>shauli</i> Nunenmacher (<i>Hyperaspis</i>)	359, 389
<i>sidneyensis</i> Blackburn (<i>Scymnus</i>)	26
<i>signata bicentralis</i> Casey (<i>Hyperaspis</i>)	408, 432
<i>signata signata</i> (Olivier) (<i>Hyperaspis</i>)	408, 429, 409
<i>signifera</i> (Reiche) (<i>Lioadalia</i>)	21

<i>significans</i> Casey (Hyperaspis)	409, 484
<i>similis</i> Casey (Paranaemia)	692
<i>simulans</i> Casey (Hyperaspis)	410, 411, 550
<i>simulans</i> Gordon (Scymnus)	244, 145
<i>simulatrix</i> Dobzhansky (Hyperaspis)	413, 520
<i>simulatus</i> , n. sp. (Hyperaspidius)	360, 370
<i>simuloides</i> Hatch (Hyperaspis)	540
<i>sinuata</i> Mulsant (Hippodamia)	707, 748
<i>sobrina</i> Casey (Olla)	828
<i>socer</i> LeConte (Scymnus)	195, 142
<i>socialis</i> Casey (Brachiacantha)	564
<i>solidus</i> Casey (Scymnus)	200, 145, 148, 150
<i>soltaii</i> , n. sp. (Brachiacantha)	558, 566
<i>sonomae</i> Casey (Scymnus)	266
<i>sonorana</i> Casey (Brachiacantha)	582
<i>sordidus</i> (Horn) (Nephus)	308, 296
<i>soularyi</i> Mulsant (Neoharmonia)	838
<i>speculifer</i> Blackburn (Rhyzobius)	35
<i>spiculinata</i> Fall (Hyperaspis)	413, 543
<i>spuria</i> LeConte (Hippodamia)	709, 750
<i>stellata</i> Casey (Brachiacantha)	579
<i>stephani</i> , n. sp. (Brachiacantha)	559, 571
<i>stigma</i> (Say) (Chilocorus)	651, 644
<i>stigma</i> Casey (Diomus)	332
<i>strabus</i> Horn (Scymnus)	154
<i>straminea</i> Chapin (Hippodamia)	750
<i>strenua</i> (Casey) (Coleomegilla)	698, 699
<i>strenuus</i> Casey (Scymnus)	210
<i>stygius</i> Casey (Scymnus)	210
<i>suavis</i> Casey (Nephus)	302
<i>subdepressa</i> Casey (Hyperaspis)	526
<i>subfasciata</i> Mulsant (Brachiacantha)	558, 559, 574
<i>subrotundus</i> Casey (Exochomus)	624, 630
<i>subsimilis</i> Casey (Hippodamia)	727
<i>subsimilis</i> Casey (Scymnus)	218
<i>subtropicus</i> (Casey) (Zilus)	76, 80
<i>subtropicus</i> Casey (Scymnus)	277
<i>subversa</i> LeConte (Coccinella)	786, 788
<i>subviridis</i> (Blackburn) (Telsimia)	28
<i>subvittata</i> (Mulsant) (Myzia)	765, 769
<i>suturalis</i> (F.) (Brumoides)	14
<i>suturalis</i> (Schwarz) (Microweisea)	38
<i>suturalis</i> Casey (Coccinella)	804
<i>suturalis</i> Thunberg (Scymnus)	32, 26, 29, 151
<i>suturalis</i> Weise (Coccidula)	657
<i>taedata</i> LeConte (Hyperaspis)	429
<i>taedata</i> LeConte (Psyllobora)	855
<i>taedatus</i> (Fall) (Diomus)	330, 317
<i>taeniata</i> LeConte (Hyperaspis)	412, 413, 509
<i>tahoensis</i> Casey (Scymnus)	270, 144, 150
<i>tau</i> LeConte (Brachiacantha)	559, 562

<i>tenebricus</i> Gordon (Scymnus)	147, 150, 248
<i>tenebrosus</i> Mulsant (Scymnus)	141
<i>tenebrosus</i> Mulsant (Scymnus)	144, 197
<i>tenuivestis</i> Casey (Scymnus)	210
<i>terminatus</i> (Say) (Diomus)	337, 317
<i>testudinaria</i> Mulsant (Neda)	22
<i>testudo</i> Casey (Brachiacantha)	560, 585
<i>tetraneura</i> Casey (Hyperaspis)	545
<i>tetraspilota</i> (Hope) (Adalia)	14
<i>tetrasticta</i> Casey (Telsimia)	28
<i>texana</i> , n. sp. (Gnathowisea)	49, 52
<i>texanus</i> Casey (Scymnus)	175
<i>texanus</i> Gordon (Diomus)	339 , 317
<i>texanus</i> LeConte (Axion)	617
<i>tibialis</i> (Say) (Hippodamia)	707, 709
<i>timberlakei</i> , n. sp. (Nephus)	296, 312
<i>toowoombae</i> Blackburn (Rhyzobius)	660
<i>toweri</i> Johnson (Epilachna)	867
<i>townsendi</i> Casey (Exochomus)	623, 631
<i>transfugatus</i> Casey (Hyperaspidium)	358, 363
<i>transversalis</i> F. (Coccinella)	16
<i>tredecimnotata</i> (Latreille) (Epilachna)	865, 871
<i>triangulum</i> Casey (Hyperaspis)	407, 466
<i>tricolor</i> Nunenmacher (Hippodamia)	720
<i>tricuspis</i> Kirby (Coccinella)	814
<i>tricyclus</i> Smith (Chilocorus)	644, 652
<i>tridens</i> Kirby (Hippodamia)	717
<i>trifurcata</i> Schaeffer (Hyperaspis)	410, 556
<i>trimaculata</i> (L.) (Hyperaspidium)	390
<i>trinifer</i> Casey (Hyperaspis)	414
<i>trinitatis</i> (Marshall) (Pseudoazya)	24, 678
<i>triplicans</i> (Casey) (Brachiacantha)	597
<i>tripustulatum</i> (Degeer) (Axion)	615
<i>tristis</i> (LeConte) (Hyperaspidium)	359, 366
<i>trivittata</i> Casey (Hippodamia)	748
<i>trogodytes</i> Mulsant (Brachiacantha)	579
<i>trogodytes</i> Mulsant (Hyperaspis)	410, 534
<i>tuckeri</i> Casey (Hyperaspis)	408, 419
<i>tumidus</i> Leng (Chilocorus)	647 , 644
<i>ulkei</i> Crotch (Ceratomegilla)	704
<i>uncus</i> Wingo (Scymnus)	256, 142
<i>undecimpunctata</i> L. (Coccinella)	16, 809 , 30, 29, 787
<i>undulata</i> (Say) (Hyperaspis)	413, 536
<i>uniformis</i> Casey (Hyperaspis)	409, 500
<i>uropygialis</i> Mulsant (Exochomus)	19
<i>ursina</i> (F.) (Brachiacantha)	560, 580
<i>utahensis</i> Gordon (Scymnus)	145, 150, 214
<i>uteana</i> Casey (Hippodamia)	727
<i>uteana</i> , n. sp. (Hyperaspis)	407, 471
<i>uteanus</i> Casey (Scymnus)	253, 144, 147
<i>uteella</i> Casey (Brachiacantha)	560, 582

<i>utilis</i> (Horn) (<i>Stethorus</i>)	90
<i>v-nigrum</i> (Mulsant) (<i>Olla</i>)	826
<i>vagans</i> (Blackburn) (<i>Stethorus</i>)	27
<i>vandykei</i> Nunenmacher (<i>Coccinella</i>)	804
<i>variegata</i> (Goeze) (<i>Hippodamia</i>)	20
<i>varivestis</i> Mulsant (<i>Epilachna</i>)	30, 29, 865, 866
<i>ventralis</i> (Erichson) (<i>Rhyzobius</i>)	35, 662
<i>venusta</i> (Melsheimer) (<i>Neoharmonia</i>)	837
<i>venustulus</i> (Mulsant) (<i>Hyperaspidius</i>)	358, 381
<i>vernix</i> Casey (<i>Hippodamia</i>)	727
<i>verrucatus</i> (Melsheimer) (<i>Axion</i>)	615
<i>vicksburgicus</i> Casey (<i>Scymnus</i>)	240
<i>vigintiduopunctata</i> (L.) (<i>Psyllobora</i>)	24
<i>vigintimaculata</i> (Say) (<i>Psyllobora</i>)	853, 855
<i>vigintiquatuorpunctata</i> (L.) (<i>Subcoccinella</i>)	32, 20, 874
<i>virginalis</i> (Wickham) (<i>Anovia</i>)	668
<i>viridipennis</i> Mulsant (<i>Neoharmonia</i>)	837
<i>vittigera</i> (Mannerheim) (<i>Paranaemia</i>)	691
<i>vittigerus</i> (LeConte) (<i>Hyperaspidius</i>)	359, 390
<i>wahlbergi</i> Mulsant (<i>Chilocorus</i>)	16
<i>wallacei</i> Crotch (<i>Cryptolaemus</i>)	17
<i>washingtoni</i> Timberlake (<i>Hippodamia</i>)	707, 715
<i>weidti</i> Casey (<i>Scymnus</i>)	260, 147, 149
<i>weisei</i> Schaeffer (<i>Hyperaspis</i>)	407, 415
<i>wellmani</i> Nunenmacher (<i>Hyperaspis</i>)	450
<i>whittonensis</i> Blackburn (<i>Scymnus</i>)	26
<i>wickhami</i> Casey (<i>Hyperaspis</i>)	408, 442
<i>wickhami</i> Gordon (<i>Nephus</i>)	307, 296
<i>wickhami</i> Gordon (<i>Scymnus</i>)	250, 144, 150
<i>wingoi</i> Gordon (<i>Scymnus</i>)	245, 142
<i>wolcotti</i> (Nunenmacher) (<i>Hyperaspidius</i>)	359, 385
<i>xanthaspis</i> (Mulsant) (<i>Diomus</i>)	317, 343
<i>zimmermanni</i> Crotch (<i>Cephaloscymnus</i>)	68, 69

INSTRUCTIONS TO AUTHORS

The *Journal of the New York Entomological Society* is devoted to the advancement and dissemination of knowledge of insects and related taxa. The costs of publishing the Journal are paid by subscriptions, membership dues, page charges, and the proceeds from an endowment established with bequests from the late C. P. Alexander and Patricia Vaurie. The Journal will consider for publication manuscripts of any length dealing with original research in entomology. Longer papers will be printed as articles, shorter ones as "scientific notes." Book reviews will be solicited by the Book Review Editor.

Manuscripts should be submitted in duplicate to: Dr. Randall T. Schuh, Editor, Journal of the New York Entomological Society, c/o Department of Entomology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024. All material must be double-spaced (including references, tables, captions, etc.) and prepared in the format of a recent issue of the Journal.

Longer manuscripts intended for submission as articles should be accompanied by a brief abstract. Footnotes should be avoided. Tables should be prepared as separate pages; they should be kept to a minimum because of the high cost of typesetting, but may be submitted as photographically reproducible material (see below). The list of references is headed "Literature Cited" and should follow the format indicated in the CBE Style Manual or as found in a recent issue of the Journal.

Illustrations (originals whenever possible) should be submitted flat, never rolled or folded, with the manuscript. Size of illustrations should be kept manageable and suitable for shipment through the US mail without being damaged. Proportions of illustrations should conform to single column format, actual page size 11.5 × 17.5 cm. Please assemble illustrations in a compact fashion in order to use journal space effectively. Figures should be numbered consecutively. Figure captions should be double-spaced, grouped together and placed at the end of the manuscript. If tables are submitted for photographic reproduction, they should be neat and clean and conform to journal format proportions.

Authors will receive page proofs, with the original manuscripts, directly from the printer. Corrected proofs should be returned promptly to the Editor to avoid publication delays. Revisions in proof should be kept to the absolute minimum. *Excessive alterations in proof will be charged to the author at the rate of \$2.00 per revision line.*

Society members will be charged a fee of \$15.00 per printed page. Non-members will be charged \$45.00 per printed page. Member authors who do not have institutional funds may petition to the Society for waiver of page charges on a once a year basis for papers not exceeding eight pages in length. Because of limited funds, all such requests will be handled on a first-come first-serve basis.

Authors will receive a reprint order blank with the proofs. Reprints are ordered directly from the printer with no benefit accruing to the Society.

Journal of the New York Entomological Society

VOLUME 93

JANUARY 1985

NO. 1

CONTENTS

The Coccinellidae (Coleoptera) of America North of Mexico *Robert D. Gordon* 1-912









86

SMITHSONIAN INSTITUTION LIBRARIES



3 9088 00832 8387